ARCHITECTURAL & ENGINEERING NEWS
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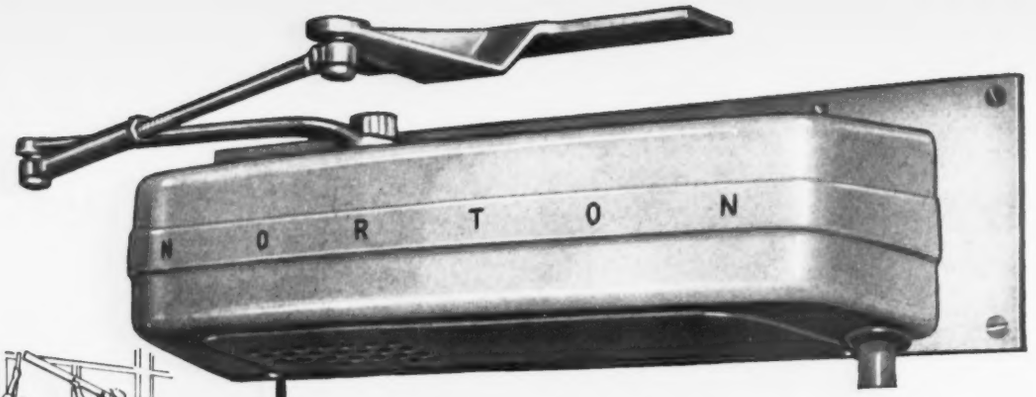
architectural & engineering NEWS

FEBRUARY 1960 VOLUME 2 NUMBER 2



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architectural & engineering
NEWS

To underscore this issue's feature content, emphasizing new methods of heating and air-conditioning, Tony Palladino generates his own graphic heat wave for our cover design.

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GAZETTE

Clinton T. Kent, PE, appointed assistant executive secretary of *Pennsylvania Society of Professional Engineers.*

Frank Greenhaus, AIA, has joined the staff of the Building Bureau of the *National Jewish Welfare Board.* He will work to provide technical consultative services in all phases of architectural planning and construction to the Jewish Community Centers and YM-YWHA's affiliated with the Board.

Jacob R. Sensibar, Engineer, elected president of *American Technion Society,* a national group sponsoring the Technion-Israel Institute of Technology.

William W. Caudill, FAIA, and Herbert H. Swinburne, AIA, elected to editorial advisory board of *Overview,* magazine for education administrators to make its debut in January.

John H. Bose, associate professor of Engineering at Columbia University, awarded Armstrong Medal of Radio Club of America, "in recognition of his pioneering contributions to the art of radio communications and particularly frequency modulation."

William J. Miller, vice president of Thorshov & Cerny, Inc., architectural and engineering firm, has moved to its St. Paul offices.

Francis R. Meisch, AIA, and Richard A. Peterson, promoted to materials control manager and chief draftsman, respectively, by Thorshov & Cerny, Inc., architects and engineers, Minneapolis and St. Paul.

Corporate ownership of Thorshov & Cerny, Inc., architects and engineers, expanded to ten stockholders: Roy N. Thorshov; Robert G. Cerny; Cecil M. Tammen; Newton E. Griffith; John G. Rauma; Frederick J. Bentz; Foster W. Dunwiddie; William J. Miller; Kenneth R. Whitehead; and John G. Cook.

Joseph A. Wilkes appointed project director for all *Federal Housing Administration* advisory services provided by *Building Research Advisory Board* of *National Academy of Sciences—National Research Council.*

James J. Souder, AIA, partner of Kiff, Colean, Voss & Souder of New York, appointed project director of Collaborative Research in Hospital Planning.

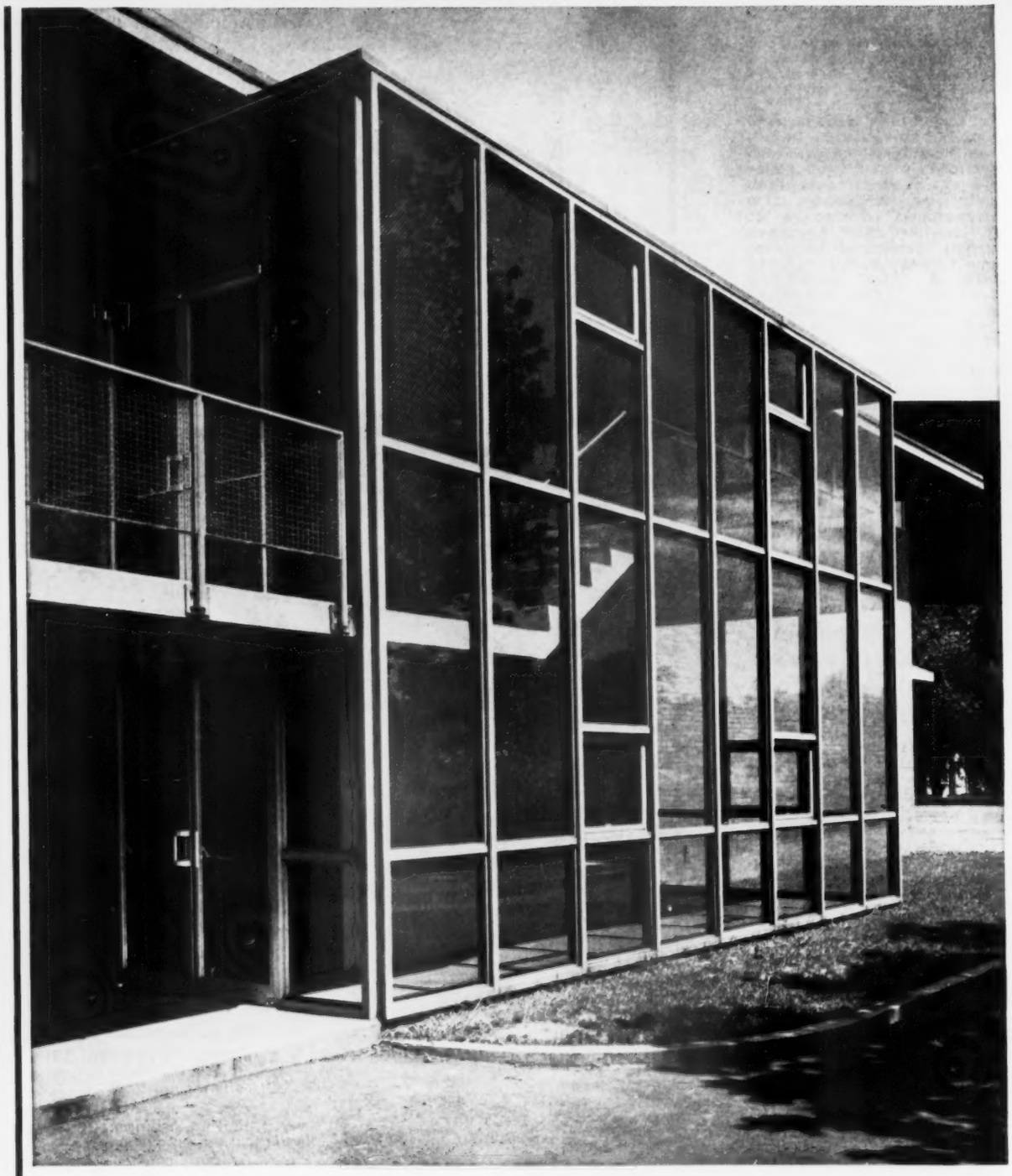
Victor A. Cusack, AIA, has rejoined Charles Luckman Associates, planning-architecture-engineering firm of Los Angeles and New York, as chief designer.

Carl O. Bergquist, Thomas Whitehead Shefelman and Edwin Norman Wilmsen added to teaching staff of University of Texas School of Architecture.

Donald O. Barth, PE, named manager of electronic computing for Unit Structures, Inc., Peshtigo, Wis.

Paul Cheremisinoff appointed vice president, general manager of American Polyglas Corp.

Clifford L. Meanor, president of *Clay Flue Lining Institute,* died on September 28.



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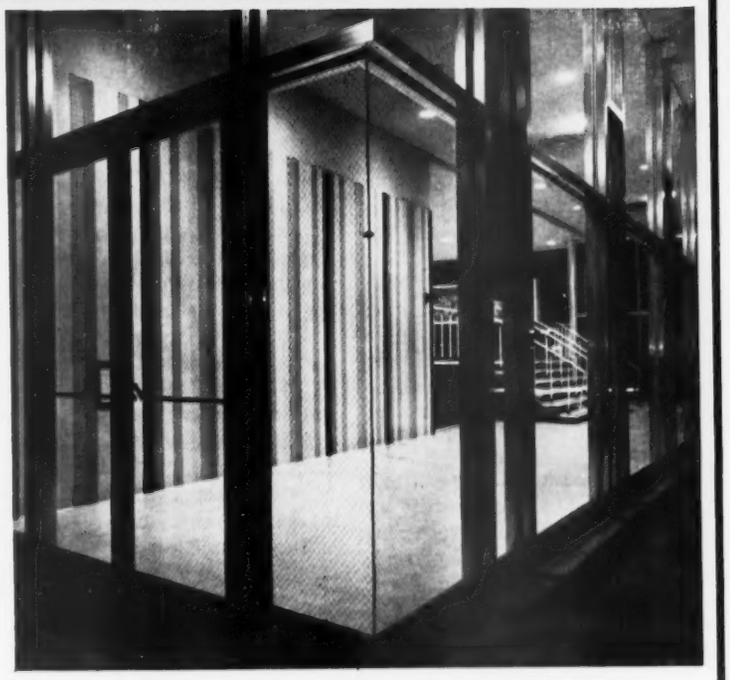

Polished Misco Wire Glass glazed in main entrance of Hellertown High School, Hellertown, Pa. *Architect*—Heyl, Bond & Miller, Allentown, Pa. *Contractor*—Gottlieb-Schneider, Bethlehem, Pa. *Glazing Contractor*—Penn Allen Glass Company, Allentown, Pa.

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GAZETTE

Frank A. Marston, civil engineer, elected president for 1959-60 by *American Society of Civil Engineers*. Other officers: Charles B. Molineaux, vice president for Zone I; Lawrence A. Elsener, vice president for Zone IV; Elmer K. Timby, director for District 1; Samuel S. Baxter, director for District 4; Thomas M. Niles, director for District 8; Trent R. Dames, director for District 11; Woodrow W. Baker, director for District 14; and Bernhard Dornblatt, director for District 15.

Eero Saarinen, FAIA, elected to membership in *American Academy of Arts and Letters*, this country's highest honorary society of writers, artists and composers. Was also recipient of annual Arts Award of Dickenson College.

Rees F. Tener, assistant chief of Testing and Specifications Section, *National Bureau of Standards*, died on December 25.

The Erie Enameling Co., Erie, Pa. has appointed Mortimer Hill Hawkins, AIA, and Anthony Konieczko, Jr., chief engineer and assistant to the chief engineer, respectively.

Edmund R. Purves, FAIA, executive director, AIA, cited by *Atomic Energy Commission* for "exceptional service rendered the atomic energy program as a member of the Advisory Board on Contract Appeals."

Office announcements

Melvin H. Friedman & Associates, mechanical and electrical engineers, to 44 So. Main St., New City, N. Y. Adrian C. Winkelhoff, PE, added to staff.

Fred S. Dubin Associates, Consulting Engineers, to 635 Farmington Ave., Hartford, Conn. James H. Quinlan, engineer, named associate.

E. D. Corwin and Associates, Inc., architects, to be known as Corwin, Seppanen & Associates, Inc., E-818 First National Bank Bldg., St. Paul, Minn.

Wilsey and Ham Engineers and Planners now known as Wilsey, Ham and Blair, of San Francisco and Los Angeles.

Roger Leliwa-Tyszkiewicz, AIA, to Academy Bldg., Newark 2, N. J.

Kainlauri, MacMullan & Associates, Inc., Architects & Engineers, to 2311 Shelby, Ann Arbor, Mich.

Benjamin E. Cave, AIA, to 329 Bush St., Salem, Ore.

Robert E. Turner, architect, now practicing as architect for Marcal, Inc., Midway Shopping Center, 1267 N. Missouri Ave., Largo, Fla.

Frederic R. Harris, Inc., consulting engineers, to 144 East 44th St., New York.

Omer J. De Bever, PE, has established Omer J. De Bever & Associates, consulting electrical engineering firm, 2872 Rowena Ave., Los Angeles, Calif.

McKee-Berger-Mansueto, Inc., construction cost consultants, have opened additional office at 300 West Washington St., Chicago, Ill.

FORECAST

OUTLOOK FOR NEW CONSTRUCTION IN 1960*

New construction expenditures are expected to reach a record-breaking total of $55.3 billion in 1960, an increase of about $1.3 billion, or 2 per cent, over 1959. In 1959, the value of work put in place will probably reach $54 billion, the first time it has ever exceeded the $50 billion mark.

In 1960, both private and public construction should maintain about the same relative importance, increasing 3 and 2 per cent respectively. Because of rising construction costs, the total dollar outlays will represent about the same physical volume (expenditures adjusted for prices changes) of work as in 1959.

With construction at this level, the demand for building materials and equipment should be sustained and the over-all impact of construction on employment remain unchanged. Therefore, new construction in 1960 should act as a stabilizing force, but not contribute to the over-all economic expansion as it did in 1959.

The anticipated $1.3 billion rise in construction outlays in 1960 represents the net effect of some key changes in recent trends. Especially significant are the downward movements of residential building (public and private) and highways, and the anticipated increase in private non-residential building activity. The expected gains and losses for most categories of construction represent sharp reversals of the 1958-59 movements, or attenuations of strong tendencies currently displayed.

The 1960 estimates reflect the expectation that any losses in construction activity in 1959 due to shortages of steel will be made up during the new year. Assuming no further tie-ups, it is expected that, though some lags in deliveries of this key material may occur early in 1960, the total supply will be adequate for the anticipated levels of construction.

The outlook further assumes that the national economy will move forward with gains approaching those in 1959. In addition, the estimates assume a continuation of the rise in construction costs which occurred during 1959, and an adequate supply of basic materials, equipment, and labor. Despite the possibility that money rates will remain high throughout 1960, it appears that investment funds will be adequate to support the dollar volume for private and public construction.

Private construction

The $37.8 billion total for private outlays in 1959—including more than $22 billion for housing, a record level—should rise in 1960 by $1 billion despite an equivalent drop in value put in place for new dwelling units. Thus, private construction, influenced in the current year mainly by the sharp resurgence of residential building, will not be so aided in 1960. Its major source of strength will be nonresidential building.

In the early part of 1960, new housing starts may begin at a lower rate than is indicated by the annual total now estimated. This will be due largely to the tight supply of mortgage funds [with the close of 1959.] However, some of the factors which combined strongly in 1959 to push up interest rates and drain off investment funds may be less in evidence as 1960 progresses. For example, pressures in the money market caused by need for Federal financing should ease and inventory accumulation by industry during the last half of 1960 may be less of a factor. It should also be noted that a tendency toward conventional mortgage financing on easier terms makes possible a somewhat lesser reliance on FHA-VA financing during a period when interest rates are as high as they are now.

Funds will be adequate not only for the expected level of housing starts but also to underwrite residential additions and alterations and non-housekeeping projects. In the latter category, the impact of accelerated motel building, college dormitory expansion programs, and the building of large hotels calls for an increase of almost $150 million in 1960 over 1959—a 20 per cent gain.

Commercial construction

Commercial construction in 1960 will likely record even greater gains than in 1959. Office buildings and warehouses will reverse the 1959 downtrend because many large office building projects underway in 1959 will contribute heavily to activity in the next 12 months. This category has included a great many large projects in recent years. Office buildings plus stores, restaurants and garages promise to account for the same value of expenditures in both 1959 and 1960.

Strength in these categories arises from the continued trend towards suburbanization throughout the United States, the need for parking facilities in central city areas, and from the high level of disposable personal income which continues to spark new peaks in the volume of retail business. New shopping center construction should continue its strong pace but lag behind the recent high level of residential activity in outlying areas. However, for the first time, stores, restaurants and garages will likely account for outlays of over $2 billion—double the annual rate of only seven years ago.

Other types of private buildings

Other types of private buildings are due to be very strong in 1960. Construction of religious buildings should exceed the billion dollar mark. After being interrupted in 1959 by the economic slowdown of 1958, private school building will continue its regular uptrend of recent years. Federal aid will be an important factor in the stimulation of private hospital construction. Social and recreational building activity in 1960 is expected to rise substantially under the influence of high incomes, and the effect of leisure time on national spending habits.

Public construction

Total public construction in 1960 is estimated at $16.5 billion, compared with $16.2 billion in 1959. The small over-all gain stems from substantial increases for some categories being offset by decreases in others. The relatively tight money market prevailing and the barrier of legal debt limits will force many states and local communities to somewhat more conservative policies than they followed in recent years. The pressure of unmet public works needs and the existence of Federal aid programs, however, tend to sustain outlays in this area. Direct Federal construction spending for military, atomic energy, conservation and development, and other facilities are not expected to change materially from the current high levels.

Public housing expenditures are also expected to decline in 1960 from the peak of $1 billion in 1959. Public housing starts are estimated at 35,000 dwelling units in 1960, compared with 40,000 in 1959. Of significance in 1960 is the reduction in the number of units to be started under the military (Capehart) housing program. Starts under other public housing programs should number 25 or 30 thousand, slightly more than in each of the last two years.

The physical volume of public educational construction in 1960 is expected to stay at about the same level as in 1959, cost increases negating the small dollar gain. Although many new bond issues have been authorized for educational construction, an unfavorable money market continues to retard the translation of these authorizations into funds for new schools.

** Based on material prepared by the Construction Industry Division, Business and Defense Services Administration, U.S. Department of Commerce, Washington, D.C.*

A|E NEWS

AIA portfolio

This year's annual convention of *The American Institute of Architects* will be held April 18 to 22 at San Francisco. Some 2,000 architects from all parts of the country are expected to hear J. Robert Oppenheimer, director of the Princeton Institute of Advanced Studies, and Cyril Northcote Parkinson, historian and author of "Parkinson's Law" among other well-known authorities in science and the humanities.

Under the general theme "Expanding Horizons" the architects will explore the trend of political, economic, technological and philosophical developments so as to help the architectural profession to keep ahead of changes in human environment.

Oppenheimer's and Parkinson's speeches and those of philosopher Morton Gabriel White of Harvard University and sociologist Wendell Bell of the University of California will be related to architecture by panels of outstanding architects.

The panel discussions and business meetings of the convention will be held at San Francisco's new Masonic Temple. Convention headquarters will be at the Mark Hopkins Hotel.

The convention program also features the ceremonial Investiture of newly elected Fellows of the AIA and a President's Reception both at San Francisco's famous City Hall.

Other convention events include a tour through San Francisco and the Bay area's outstanding houses, and an "open house" party on San Francisco's historic Jackson Square. Convention goers are invited to participate in the host city's annual Black and White Symphony Ball.

The San Francisco Museum of Art will show an extensive exhibition of the work of LeCorbusier, world famous architect, planner, painter and sculpture. Born in Switzerland, LeCorbusier, whose real name is Charles Edouard Jeanneret, has created important buildings all over the world. Among his most famous works is the planning of the city of Chandigarh, the new capital of Punjab in India.

The LeCorbusier exhibit was designed and arranged in Switzerland. From San Francisco it will travel to Tokyo where it will be shown in LeCorbusier's newly completed Museum of Western Art.

In the course of its Annual Dinner, the AIA will again present a Gold Medal to an outstanding architect as well as the Institute's other awards. The R. S. Reynolds Memorial Award, the Homes for Better Living Awards and other honors will be presented at morning sessions. Winners of these awards have not yet been selected.

Five distinguished U.S. and Canadian architects have been named to select the foremost contemporary structure in the world whose creative use of aluminum could significantly influence the architecture of our times. The designer of that building will be given the $25,000 R. S. Reynolds Memorial Award to be awarded as mentioned above at the San Francisco AIA convention.

The Institute has named as members of the 1960 Reynolds Awards Jury Dr. Walter Gropius of Cambridge, Massachusetts; Philip Will, Jr. of Chicago, Illinois; James M. Hunter of Boulder, Colorado; Arthur Fehr of Austin, Texas and C. E. Pratt of Vancouver, British Columbia.

Dr. Gropius, as one of the fathers of contemporary architecture is famed for his leadership of the Bauhaus school of design. This Jury will meet in Washington, March 14-15 to consider nominations for the Reynolds Award. The chairman, elected by the Jury, will announce the recipient of the Reynolds Award after judging is completed. The AIA administers the nominations, Jury selections and all other aspects of the Reynolds Award. To date 71 American and 23 foreign

(Continued on page 6)

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(Continued from page 5)

architects have been nominated for the 1960 Reynolds Award.

"It is imperative that architects assume the task of designing all the nation's homes, not just the choicest and most expensive, and that homebuilders employ the finest talents available to them." That is the message of a special 148-page issue of the *AIA Journal* published by the Institute. This issue is devoted entirely to architect-homebuilder collaboration. The AIA is distributing this issue to homebuilders without charge.

West coast report

Plans for a $200,000 library, to be donated to the City of Fullerton, California by the Hunt Foods and Industries Foundation, were made public with the announcement that the architectural firm of *William L. Pereira and Associates* of Los Angeles will design the unique project.

Representing one of the few public libraries on the west coast to be entirely financed by private industry, the new building will occupy a 7-acre park-like setting and will serve not only as a branch library but as a cultural and community center as well. Accordingly, the plans make provision for a multipurpose meeting room and auditorium and a special music room for the audition of both live and recorded music. Other special features include a lounge, housing rare editions, patios for outdoor reading and interior exhibit space for art and library displays. The air-conditioned building will provide 10,000 square feet of floor space. Completion is planned for early 1961.

A public relations program has been initiated by the *California Council of Civil Engineers and Land Surveyors* to promulgate news of the activities of private engineering and surveying firms in that state. Among the more ambitious promotional projects planned by the Council is a 4-page, bi-monthly newsletter to acquaint member firms with ways to promote themselves and the Council on a local level.

Among new projects for which *Welton Becket and Associates*, Architects and Engineers of Los Angeles, New York and San Francisco have been retained are master-plan campus construction for the University of California at Los Angeles and a new $100 million downtown Houston, Texas complex to be known as Cullen Center. The UCLA program will constitute the largest educational building program in the United States. It will include 150 projects totalling $370 million for individual structures and for major addition to existing buildings. The Becket staff planned, designed and engineered six of the projects currently under construction or in the drawing stage: Sproul Residence Hall; Residence Hall no. 3; the Student Union Building; Parking Structure A; and the Neuropsychiatric Institute and Marion Davies Children's Clinic wings of the medical center, also a Becket project.

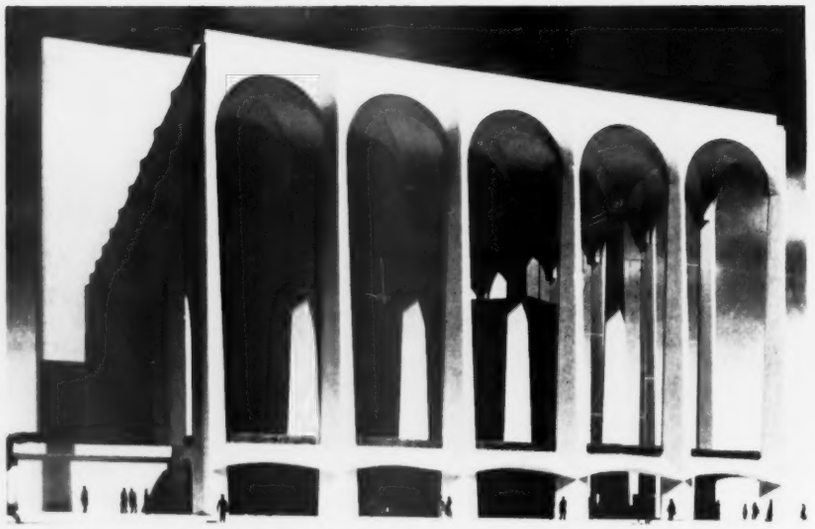
Cullen Center, in downtown Houston, Texas is the most comprehensively privately financed downtown development ever planned in any U.S. city according to the owner's representatives. The Becket office is commissioned to master plan the 12-acre site, which will contain three major office buildings, a 500-room hotel, apartments, parking and transportation facilities, restaurants, clubs and retail shops.

Corrigendum

The captions were transposed beneath two photos on page 8, of the December, 1959, issue of *Architectural & Engineering News*. Bottom row, center photo, depicts Parke-Davis Co. Los Angeles office and warehouse, designed by *Charles Luckman Associates*, planning-architecture-engineering firm of Los Angeles; bottom row, right photo, shows Palais des Sports, Paris, France, designed by Architect Pierre Dufau.

Manhattan scene

Lincoln Center for the Performing Arts recently made public the latest conception of the exterior design of the New Metropolitan Opera House. *Wallace K. Harrison, FAIA* of the architectural firm of Harrison and Abramovitz stated that the design currently shown (see photo) is still subject to final approval by officials of the Center and the Metropolitan Opera. The latest development in design brings the large lobby and auditorium section of the Opera House into closer relationship with the spacious exterior parks and plazas and the other buildings of the Lincoln complex. Ten-story columns, extending from ground to roof, now enclose the lobby and auditorium on three sides. Through large mullioned windows between the columns can be seen the large lobby and promenade areas and the shape of the auditorium within. Behind this, in a 20-story tower, will be the Met's backstage and workshop facilities and rehearsal halls. Cost estimates approach $31 million.



Model of latest exterior design revision of the new Metropolitan Opera House to be constructed at New York's Lincoln Center for the Performing Arts. (Photo: Ezra Stoller)

Plans for displaying the National Gold Medal Exhibition of *The Architectural League of New York* have been announced by David R. Campbell, President of The American Craftmen's Council. The League's exhibition will recognize outstanding achievements of the last five years in the inter-related arts of sculpture, interior design, engineering, mural decoration, landscape architecture, craftsmanship, and industrial design. Following a New York showing at the *Museum of Contemporary Crafts* from February 26 through May 15, the exhibit will be circulated by the American Federation of Arts to galleries and museums throughout the country. Morris Ketchum, Jr., FAIA, President of the Architectural League of New York said, "For nearly eighty

Plans for exhibiting the 61st National Gold Medal Exhibition of the Architectural League of New York are reviewed by David R. Campbell (left), President of the American Craftsmen's Council, and Morris Ketchum, Jr., FAIA, President of the League.

years the Architectural League has stood for the belief that architecture provides a framework for all the building arts and that without these building arts no work of architecture is fully realized. The League's 61st national exhibition provides pictorial proof that the last five years of material prosperity in America have given our country's practitioners of the building arts the opportunity to create a new and brilliant renaissance in the art and science of building."

Education and research

Grants totaling more than $1.3 million have been awarded to 143 universities and colleges in the *E. I. duPont deNemours and Company's* annual program of aid to education. The program is for fundamental research by universities, for strengthening the teaching of science and related subjects, and for facilities for education or research in science and engineering. The largest part of the program is to help strengthen the education of scientists and engineers. Grants totalling $580,000 were awarded for the 1960-61 academic year to more than 100 colleges and universities to support the teaching of science and mathematics as well as other liberal arts subjects; for education and research in biochemistry in medical schools; and for postgraduate teaching awards and scholarships for prospective high school teachers of science and mathematics. A $250,000 fund was authorized for capital grants for science and engineering facilities. This provided awards to 12 independently controlled institutions. Ranging from $5,000 to $50,000 each, these are grants to help with the cost of new buildings, equipment, or renovation.

Topping 36 American colleges entered in a recent international steel bridge competition, three *California State Polytechnic College* graduates of this year have been awarded third place and $1,000. The Cal Poly trio, James A. Wood, Jack A. Berridge, and William O. Evers, all of San Diego, was the U.S. leader in the college division of the contest which was sponsored by the American Institute of Steel Construction, Inc., New York.

Columbia University's School of Engineering will offer a new degree of Nuclear Engineer beginning with

(Continued on page 8)

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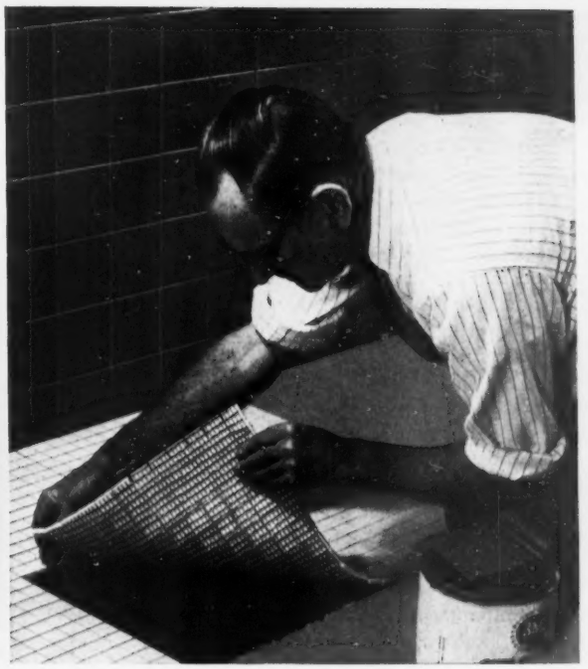

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(Continued from page 7)

the 1960-61 academic year next September. Donald Barr, assistant to the dean of the Faculty of Engineering, said the new degree is for professional engineers who wish to practice nuclear engineering but who do not need a doctorate. Mr. Barr said the degree of Nuclear Engineer, to be called the "N.E." degree, will be "more advanced than a Master of Science degree but less rigorous than a doctorate." He said the degree requires 30 points of courses beyond the Master of Science degree, but requires 60 points beyond a Bachelor of Science degree if the candidate did not previously receive an M.S. The N.E. degree does not require a thesis if the student submitted a thesis for a Master's degree. Comprehensive examinations are required, however.

ASCE/CEC/ACI news

Twelve civil engineering projects have been nominated for the "Outstanding Civil Engineering Achievement of 1959," the *American Society of Civil Engineers* announced earlier this month. Among the projects nominated was the Executive House in Chicago, a 39-story reinforced concrete apartment house constructed just north of the Loop District. The 371-foot height of the structure makes it the tallest reinforced concrete structure of its kind in the United States. The winner, representing the most outstanding achievement, is expected to be announced by the Society's Board of Direction at its national convention in New Orleans in March.

The *Consulting Engineers Council* brochure "Framework for the Future," a public relations booklet outlining the story of America's consulting engineering profession, was the recipient recently of special recognition by *Graphis Press*, the International yearbook of graphic and advertising art. (See photo) Calling the C.E.C. publication "an outstanding example of graphic design," the international journal requested permission to supply copies to "schools of art, libraries, printers, ad agencies and public relations firms in the U.S., Britain, India, Europe, Japan and South Africa." This honor is considered the "Oscar" of the publishing industry.

Park Avenue's newest glass-and-aluminum curtain wall structure is the eleven-story, $7.8 million world headquarters building of the Pepsi-Cola Company located in New York City. Architects: Skidmore, Owings and Merrill. (Photo: J. Alex Langley.)

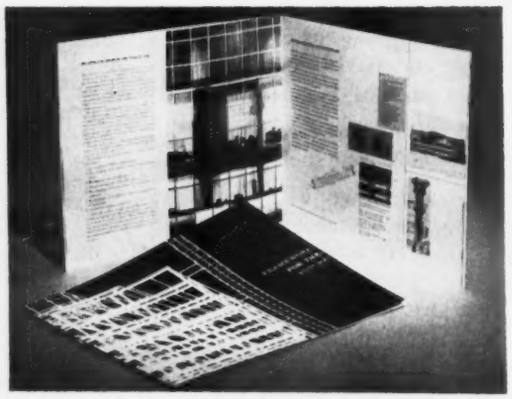


Photo of the Consulting Engineers Council brochure, "Framework For The Future," which was the recipient of special recognition by Graphis Press (see story at left.)

Hawthorne Cedar Knolls School, a non-sectarian school for emotionally disturbed children in Hawthorne, New York, recently opened its new staff apartment house. Named the Wilhelm Weinberg House after the donor, a well-known art collector, the building provides an attractive and flexible staff-member residence. It consists of four duplex apartments whose bedrooms can be shifted from one apartment to another, as required, by utilizing a system of pre-framed doorway closures. Other features are individual entrances and gardens, and interior natural lighting by use of a row of plastic "bubble" skylights. Architects: Steinhardt and Thompson of New York.

View of the Eastern Pennsylvania State School and Hospital, scheduled for construction by the General State Authority in lower Bucks County, Pa. Designed as a self-contained residential community, the State School will be operated by the Department of Public Welfare as Pennsylvania's first state institution expressly for the care and treatment of emotionally disturbed children. Construction bids on the $8 million first phase of the project are due this month. Architect: Vincent G. Kling, AIA, of Philadelphia, Pa. (Rendering: Schwartz.)

One of the nation's largest and most modern medical centers dedicated to the care and treatment of the physically handicapped reached the final phase of a $6.5 million building program this month with the completion of the new Los Angeles Orthopaedic Hospital in California. The six-story structure makes provision for six surgeries, 160 beds, emergency service, closed-circuit television and even schoolrooms. Architects and Engineers: Albert C. Martin & Associates of Los Angeles, Calif. (Photo: Julius Shulman.)

COMMUNICATIONS

A/E NEWS welcomes the opinions of its readers. Letters should be addressed to: Editor, Architectural and Engineering News 452 Fifth Ave., N. Y. 18.

Editor:

Mr. Cowgill brought me your December issue which contained your reprint of his "Architect-Engineer Relations." He pointed out a couple of errors in the credit line at the bottom. . . .

He points out that he did not have the title of Dean at the School of Architecture at VPI, but was called "Head." He would rather now be called "Professor of Architecture Emeritus." In addition, Mr. Green is an attorney in Harrisburg, not Pittsburgh. . . .

Sincerely,
Joseph Watterson, AIA, Editor
AIA Journal
The American Institute of Architects
Washington, D. C.

Editor:

We like your representation on Building Science Documentation in the December issue very much and we probably will want to make a display of it in the Spring Conferences in New York in rather a more expanded form than at the Shoreham meetings. May I have another copy, please, as the first will be considerably cut up, and we need one for our active magazine file. . . .

Sincerely,
Harry Hewes
Information Services
Building Research Institute
Washington, D. C.

Editor:

This is to thank you for the first issue of Architectural & Engineering News I just received (Vol. I, no. 12), and to congratulate you on your new type of magazine, encompassing architecture, engineering and related products, equipment, and materials under one cover.

I want to wish your magazine the deserved success, and am sure that other fellow architects will share my enthusiasm on this matter. . . .

Very truly yours,
Roger Leliwa-Tyszkiewicz, AIA
Newark, N. J.

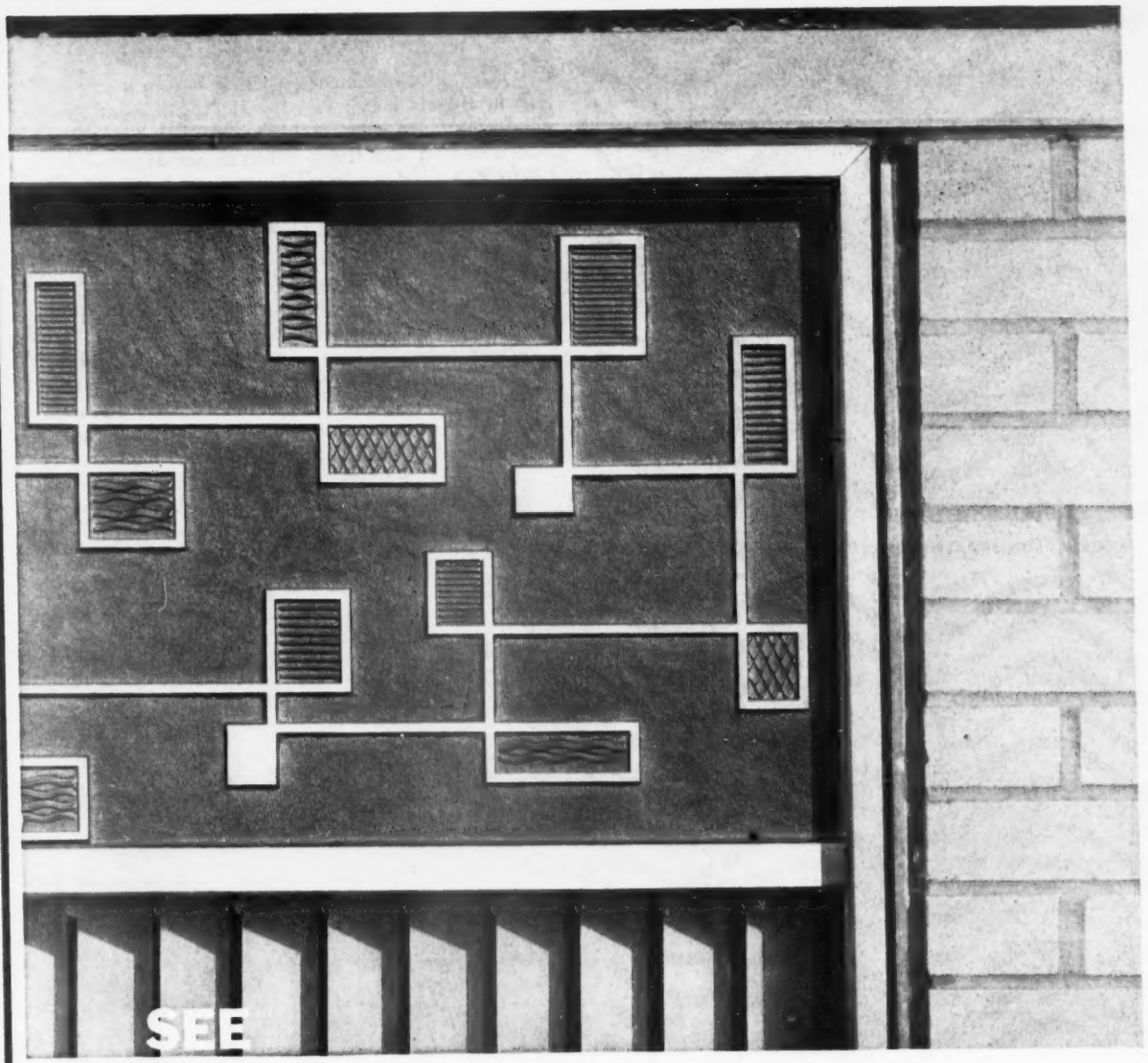
Editor:

I am interested in modular measure drafting and would like to know more about it for the purpose of use in my office, which is one of general architectural practice. Please advise a source of information on the subject.

Thank you.

Very truly yours,
Frank A. Hecker, Architect
Teaneck, N. J.

Editor's note: *For further information, contact Byron C. Bloomfield, Executive Director, Modular Building Standards Assn., 2029 K St., N. W., Washington 6, D. C.*



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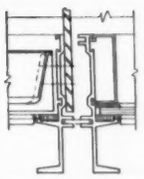

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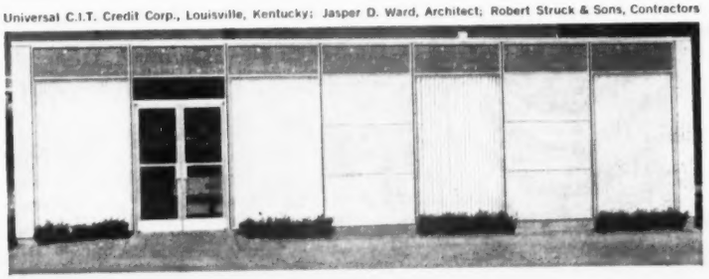

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Circle 104 for further information

AIR-CONDITIONING THE HOSPITAL-SURGICAL SUITE

by Arnold L. Windman, PE, from a talk delivered before the Hospital and Health committee, New York Chapter of the AIA.*

A mechanical engineer speaking before a group of architects has a rare forum to acquaint the architect with some of his problems in the construction of buildings. The subject at hand is hospitals, and specifically about the operating room within the hospital and the various problems associated with air-conditioning them.

Briefly, several broad subjects will be covered, namely, why we air-condition the modern operating room; the various methods by which air-conditioning can be achieved; a discussion of the various components of an operating room air-conditioning system with special emphasis on the problems of air filtration and finally, some discussion as to how the air is best circulated within the operating room and how it is best exhausted.

It is now a universally accepted requirement that hospital operating rooms be air-conditioned. It is obvious that the surgeon, the anesthetist and the corps of nurses and assistants who are present in an operating room during the course of an operation will work and function more efficiently in an atmosphere where the dry bulb temperature is in the 70's rather than one in the 90's or higher. In addition, clinical studies have shown that the recuperative power of the patient appears to be greater when surgery is performed in an air-conditioned rather than in a non air-conditioned space.

**Arnold L. Windman, PE, is an associate of the New York consulting engineering firm of Syska & Hennessy, Inc. As project supervisor for the firm, Mr. Windman has been associated with such outstanding projects as the New York University-Bellevue Medical Center, the Union Carbide building, and the U.S. Air Force Academy in Colorado. A member of ASME and ASHRAE, he maintains licensure in New York and New Jersey.*

The requirements of the air-conditioning system are to maintain certain operating room dry bulb temperatures and relative humidities and to do so without creating drafts. The air supply should be as free of air-borne bacteria as possible. As in most features of hospital construction, the ultimate system is usually a compromise between what the administration and medical staff wants and what the hospital can afford. This is true because, in most respects, there are no absolute criteria for the air-conditioning system or its components.

Once we get beyond the very definite requirement of conditions to be maintained, namely from 72° to 80°F and from 55 to 60 per cent relative humidity, the types and arrangements of air-conditioning systems to satisfy these conditions are endless. Before we go further, however, it is important to remember that, as of today, these temperature and humidity criteria are accepted. The dry bulb temperature between 72° and 80°F is in a range to provide comfort for the staff and apparently prevents exhaustion of patients as evidenced by their more rapid recovery. The relative humidity reduces the danger of static electricity which may cause serious explosions. We must bear in mind, however, that while these are established conditions at the present time, it is conceivable that different conditions will be recommended in the future.

As the reader is probably aware, higher relative humidities are already being recommended for certain types of surgery, particularly surgery in connection with brain operations.

In general, there are two broad types of air-conditioning dehumidification systems which lend themselves to operating room applications. These systems are capable of maintaining the desired conditions and are easily adaptable to the requirements for individual automatic control in each operating room.

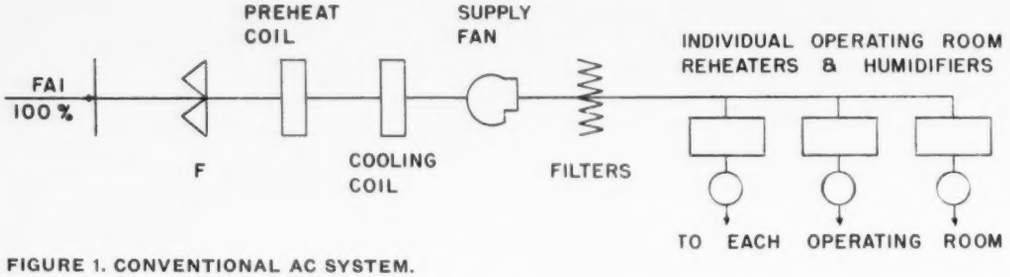

FIGURE 1. CONVENTIONAL AC SYSTEM.

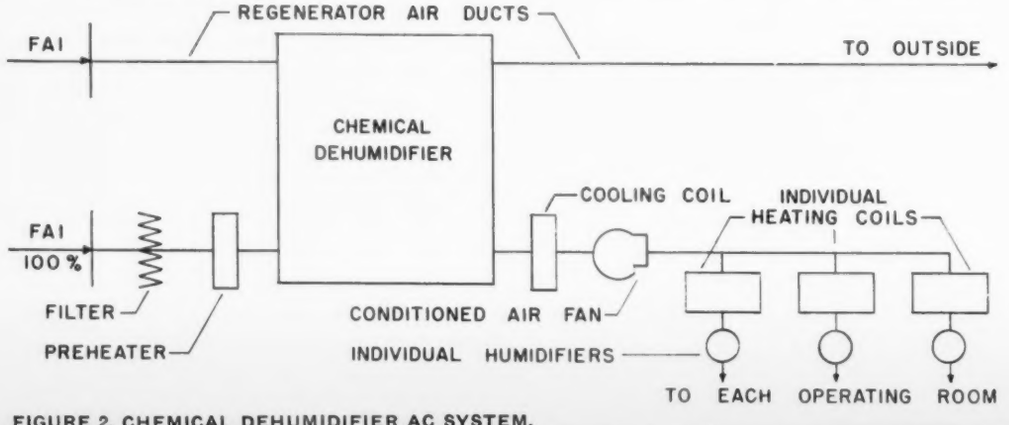

FIGURE 2. CHEMICAL DEHUMIDIFIER AC SYSTEM.

The first broad system is that which we might term the conventional air-conditioning system. This system would employ either a chilled water or Freon cooling coil in a conventional air-conditioning casing. Individual operating room control is obtainable either by providing individual reheating coils and humidifiers or by employing a dual duct distribution system with warm air and cold air mixed individually at each operating room. Individual humidifiers would again be provided. (*See figure 1.*)

The second type of system would be one employing a chemical dehumidifier. This dehumidifier contains an adsorbent solution of lithium chloride and accomplishes dehumidification chemically. Individual heating coils and humidifiers are provided for each operating room. (*See figure 2.*)

For the more conventional system, the typical air handling apparatus consists of a casing containing a filter section, a preheat coil and a cooling coil through which air is drawn by a centrifugal fan. For operating room applications, it is essential that adequate space be provided between the various elements to permit entrance of maintenance personnel for thorough cleaning. The drain pan is provided underneath the cooling coil to accommodate the water of condensation and this should be properly pitched and should have adequately sized drainage piping to insure proper drainage of water. Stagnant pools of water are breeding places for bacteria.

It should be noted that a disadvantage of the conventional air-conditioning system as compared with the chemical dehumidifier is, that in the former, the moisture in the air is removed by being condensed on the cold coil surface, and the wetted areas of the coil will result in an increase of air-borne bacteria.

The chemical dehumidifying system consists of the chemical dehumidifier followed by a dry cooling coil and individual reheat coils and humidifiers. In addition, chemical dehumidifiers require a duct system to remove the saturated air required for regenerating the chemical solution. Each of the air systems would be provided with filters and preheat coils.

Air-conditioning for a conventional operating room may vary in cost from $7,500 to $10,000 if conventional apparatus is employed. The use of chemical dehumidifiers will increase this cost substantially.

Probably nowhere in operating room air-conditioning systems is the word "compromise" applied more than to the air filters, and I think that a detailed discussion of the various types with their respective costs and efficiencies is warranted.

In some systems, where space and budget considerations permit, the filters are installed both before the coils to keep the coil surface clean and *after* the fan. The filter installed after the fan is always the more efficient of the two. This location precludes the entrance of any air on the discharge side of the filter. It may seem that since the duct

(Continued on page 12)

COPPER

simplifies plumbing in big addition to Children's Hospital, Pittsburgh

ARCHITECT'S RENDERING of Children's Hospital Addition (foreground) at Pittsburgh. *Architect*: Alfred D. Reid Associates, Pittsburgh. *Consulting Engineer*: J. A. Murray, Pittsburgh. *Plumbing Contractor*: Sauer, Inc., Pittsburgh.

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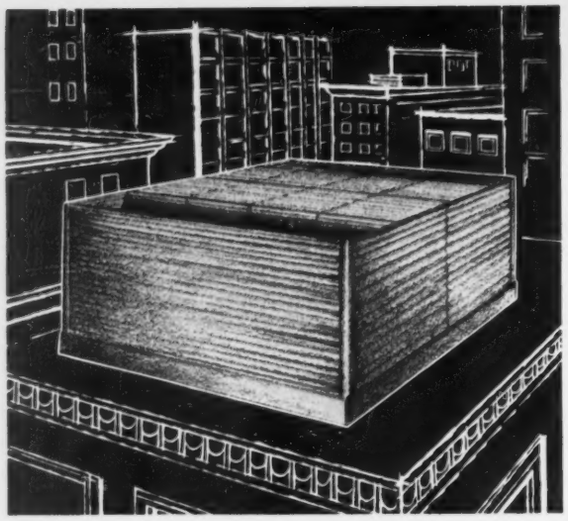

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AIR-CONDITIONING THE HOSPITAL-SURGICAL SUITE

(Continued from page 11)

work on the inlet side of the fan is under negative pressure contaminated air may leak in, but on the discharge side of the fan air will only leak out of the system.

In general, there are three basic types of filters. First, the impingement type where the filter medium is dipped in an adhesive. Next there is the impaction or dry type. Next is the electronic precipitator in which the dirt is precipitated from the air electronically. Any of the above filter types may be combined with an air washer where the air is passed through a washer or through a chemical spray.

Of the various groupings, the impingement type filter is usually the lowest in cost and the lowest in efficiency. The impaction type is available in a range of efficiencies with the cost of each filter proportionate to its efficiency. The electronic precipitator and the combinations employing the air washer are the most efficient but also the most expensive.

In recent years, hospital authorities have been more and more concerned over the frequent cases of staphylococcus infection resulting after surgery. It has been determined that lithium chloride is a powerful sterilizing agent. The reader may recall, that in one of the air-conditioners described, a chemical dehumidifier was used. One of these dehumidifiers, marketed under the name of *Kathabar*, employs lithium chloride as the dehumidifying agent, since one of the characteristics of this chemical is its ability to adsorb water. Tests have indicated that the use of this equipment materially reduces the number of air-borne micro-organisms within the space served by the equipment. The probable reason that this equipment has not found more widespread use, in addition to its budget problems, would appear to be that while the ability of this chemical to reduce the bacteria count is proven, its effect on the incidence of stapyhlococcus infection is *not proved*. This may well be due to the degree of sterilization resulting from present day hospital operating room procedures.

The air-conditioning load in the operating room is determined by the usual factors, namely lights, population, transmission, heat producing equipment and solar heat gain. While little can be done about the population and the lighting loads, much can be accomplished by the elimination of solar heat gain and the reduction of heat gain by transmission and heat producing equipment. From the air-conditioning standpoint, the ideal hospital operating room is one without windows. If windows are provided, they must be of the double-glazed type to prevent condensation when inside humidities are high and outside dry bulb temperatures are low. Heat producing equipment should be well enclosed and usual practice is to draw the room exhaust air over it, preventing the heat from getting into the room.

Normal operating room design will result in an average air supply in the order of 12 to 15 air changes per hour or one complete change of air every four or five minutes. It is generally agreed that systems employing 100 per cent outside air follow the best practice. The air should be removed from the operating room at both high and low levels since heavier than air gases may be employed.

Recent tests have shown that there is some evidence of a lack of any material effect on bacteria count due to recirculation of air through an air-conditioning unit for operating rooms. Where budget conditions are stringent, and subject to the approval of the hospital medical staff, it therefore becomes permissible to design systems employing as much as 50 per cent recirculated air. This consideration actually permits the installation of self-contained package type air-conditioning equipment directly within the operating room. The National Board of Fire Underwriters recognizes that this package type equipment is permissible and sets up requirements for its construction to guard against the explosion hazard. The author would recommend, however, that the use of such systems should be limited to existing hospital structures and then only where the medical staff approves and where space and budget limitations make it impossible to employ other means of air-conditioning.

The problem of supply air into a hospital operating room must consider both the patient and the hospital personnel. The conventional method of introducing air should be such that air velocities below 50 feet per minute at the operating level are maintained to prevent drafty conditions. Generally, we have found that the most acceptable way of accomplishing this is by the use of several ceiling diffusers.

Several recently proposed methods suggest the introduction of the clean-conditioned air directly over the patient area in order that this area may be "washed" with clean filtered air. A certain degree of discomfort of the operating room personnel will be expected if this method is employed and medical staffs must be prepared to accept the unfavorable conditions.

The automatic control in the operating rooms is obtained by the installation of a thermostat and humidistat. The thermostat controls either the reheat coil or the mixing box valve, while the humidistat controls operation of the humidifier. Each operating room must have its own individual automatic control.

As a final note, the reader may be interested in having an idea of the space required for the air handling apparatus for operating room air-conditioning. For a group of four typical operating rooms, a space approximately 10 feet by 20 feet should be provided for the supply air fans and casing and the exhaust air fan. It is my impression that where more than four operating rooms are to be air-conditioned, more than one air handling unit should be provided to permit maintenance to be properly scheduled with operating room use.

NEW AIR HEATING METHODS by Herbert T. Gilkey*

Whenever one proposes to discuss new methods of heating, whether by air or some other medium, he is bound to be undecided concerning the emphasis which should be placed upon the heating equipment as such and the emphasis which should be placed upon the system. Furthermore, he wonders to what extent heating can be separated from the larger field of air-conditioning, for complete separation is impossible. And, finally, he wonders about the definition of the word "new." Does the term "new" imply the blue-sky development, the distant reality, or that which is just becoming commercially available?

None of these questions can be answered easily, but neither can any be ignored. Hence, it is necessary to divide time and attention in proportion to numbers of developments and their importance to the end result.

Whenever we speak of heating, we must bear in mind that we are actually speaking of providing comfort in a space during that period of the year in which heat must be supplied to that space. Hence, we are speaking of one phase of comfort air-conditioning. In other words, the term "air-conditioning" is applicable equally to heating and to cooling, and indeed implies more than either of the two.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers has adopted the following as its definition of comfort air-conditioning:

> *"The process of treating air so as to control simultaneously its temperature, humidity, cleanliness, and distribution to meet the comfort requirements of the occupants of the conditioned space."*

The definition does not specify how this process shall be carried out; rather, it specifies what must be achieved if the definition is to be satisfied. These things which are to be achieved are simultaneous control of the temperature, humidity, cleanliness, and distribution of the air. The definition goes further to state the objective of this simultaneous control—meeting the comfort requirements of the occupants of the conditioned space. Occupant comfort must result if the combination of equipment and distribution system performs as it should.

I do not wish to get into a discussion of physiology or sensations of comfort here, but I do think it is important to point out briefly what this definition implies. In the first place, it implies that there is not one definition of comfort air-conditioning during the summer and another during the winter, except insofar as the comfort requirements of the occupants of the space may change from one season to another. It implies that there is not one definition for one heating system and a second definition for another type of heating. Most importantly, however, it implies that the distribution system is at least as important as the heating equipment if the definition is to be satisfied. Indeed, experience shows that the distribution system is much more subject to inadequate design and improper installation than is most equipment on the market today. Furthermore, the majority of equipment failures are directly attributable to improper application. Effectively, of course, such failures are due to *system* rather than to *equipment*.

This is not to say that equipment is unimportant, nor is it to say that equipment development is at a standstill. Furthermore, it is quite obvious that the distribution system cannot perform if the equipment does not perform.

I believe that the heating industry is on the verge of major break-throughs which will result in totally new designs using new materials and techniques. Already some of these things are on the market, but it may be some time before all of their characteristics can be used to best advantage. It is yet difficult to predict all of the ramifications of some of these developments, but some possibilities are obvious. The furnace heat exchanger can be made a great deal smaller as a result of some of these new developments. For example, a direct-fired heat exchanger of about the same size and configuration as the cooling coil on an air-conditioning unit no longer stretches the imagination.

A great deal of work has been done recently on developing methods of catalytic combustion using gaseous fuels. Even though a number of very interesting and useful devices employing this principle have been developed, it is not yet clear exactly what name should be applied to them. One who has studied this subject[1] much more deeply than I, suggests the term "catalytic-surface combustion," and even goes further to speak of "catalytic and surface combustion." On the former basis, the earliest literature seems to appear about 1910; on the latter basis, the earliest patents go all the way back to 1858. Hence, we are back to our question in semantics —how new is new?

Another authority[2] speaks in terms of "thermocatalytic reactors." One device described by this terminology consists of a porous ceramic tube into which a gas-air mixture is fed under pressure. After the fuel air mixture has been ignited on the outside of the tube and the tube

(Continued on page 14)

** Mr. Gilkey is Director of Technical Services of the National Warm Air Heating and Air-Conditioning Assn., Cleveland, Ohio. Mr. Gilkey's paper was presented at the 1959 Building Research Institute Conference on New Heating Techniques.*

NEW AIR HEATING METHODS

(Continued from page 13)

itself has come up to temperature, essentially flameless combustion is maintained. The tube itself is incandescent and there is a surface plasma which has a temperature of around 1,800° or 2,000° F. Obviously, the tube is constructed of a rather special ceramic material, for its walls may be only from ⅛ to ¼ inch thick, while the temperature gradients across them may be in excess of 2,000° F. Gradients of this magnitude cause high thermal and mechanical stress. Such devices have been applied in both theoretical and experimental heating units. At present, economics seem to suggest that such units will not be on the market immediately. Nevertheless, from the engineering standpoint, a number of exciting possibilities exist. Among these are much more compact equipment, as a result of the higher energy release rate per sq. ft. of heat exchanger and combustion chamber surfaces. The possibilities of higher efficiencies, lower flue-gas temperatures, and simplified chimneys, resulting partly from the use of either induced or forced draft venting, also exist.

Another approach would be thermionic conversion[3] which is, in a sense, a variation on the thermoelectric principle about which you have heard. This particular approach is based upon the phenomenon of electron emission from metals at high temperatures. This is known as the Edison effect. If we have two metal plates, one heated and the other cool, electrons will be emitted from the high temperature plate to the low temperature plate, setting up an electric circuit. Thus, energy in the form of heat is converted directly into energy in the form of electricity, essentially the same thing that occurs in a thermoelectric generator. Of course, I have presented this in a grossly oversimplified manner, for there are many problems to be overcome in developing practicable thermionic converters for use in this industry. Nevertheless, they present a number of fascinating possibilities, both for heating and for cooling.

Of course, this rather brief description of two new combustion devices is not meant to be all-inclusive. As a matter of fact, a surface-catalytic combustion device has been on the market for the last few years, and has been widely used in special applications, including commercial and industrial radiant space heating. Research on the application of these principles to other fuels is under way in both the liquid and solid fuel industries.

New combustion device

The oil heating industry has had added to its ranks recently a new combustion device which is more revolutionary in its performance than in its concept. In this particular instance, the oil is atomized and mixed with air in a manner similar in many respects to the conventional oil burner. Rather than being blown into the combustion chamber, however, it is sucked in by an induced draft fan. In this respect it differs from conventional oil burners. By utilizing this principle properly, very clean, high efficiency combustion is obtained. Two reasons have been advanced for this. First, proper draft and combustion air supply are established almost immediately, and second, it is claimed that better control of the combustion process can be maintained. Since the need for natural draft is eliminated, it is possible to exhaust the products of combustion at a much lower temperature than is conventionally required. In addition, the furnace is vented under pressure, thus reducing chimney dimensions and simplifying chimney requirements.

No discussion of new equipment developments would be complete without at least mentioning the heat pump and electric resistance heating. Each is applicable as the heat source for an air system. In fact, the heat pump has been applied in residential, commercial, and industrial structures and both as unitary and central station equipment. For smaller installations, remote component equipment using direct expansion coils and similar in appearance to summer air-conditioning equipment, is now available. In the larger application, the equipment, which may involve multi-stage compression, chills water in the summer and heats it in the winter. Heat exchangers are used in conjunction with air distribution systems to maintain comfort conditions within the structure.

Electric resistance heating

Electric resistance heating has also been successfully applied to the air system. Several electric furnaces are either available now or will be shortly. Furthermore, resistance coil sections are in common use to provide supplemental heat on heat pump installations. The electric furnace provides all the advantages of the air system—temperature control, air circulation, air cleaning, and humidity control—while maintaining the convenience features of the electric heat source. In view of the wide interest exhibited by the various fuel industries, I am confident that these and other developments will make an increasing impact upon the heating field. They, in turn, will require reappraisal of our current design procedures for the distribution system.

System component design

Advances in system component design have also been made. For example, simpler and relatively inexpensive electrostatic air cleaners are now available. They cost more than the more conventional type of filter, but they also do a more complete air cleaning job. It is important to remember that control of cleanliness of the air was one of the factors in the definition of comfort air-conditioning. I must add here that the air system is the only one in which a wide variety of air cleaning devices are readily available. I do not point this out defensively, for no properly designed and installed heating system creates dirt, and I deny categorically that one system is inherently dirtier than another. On the other hand, the ability to remove impurities which may vary in size from lint balls to particles of cigarette smoke and other annoying or unhealthful irritants is indeed impressive.

Control components and systems have also changed greatly during the last few years. Not only have controls been restyled for more pleasing appearance and redesigned for improved precision, but also entirely new concepts of control have been introduced. This trend started a few years ago with the introduction of the electronic control system. One of the things achieved by the use of electronic controls in smaller systems was to increase slightly the indoor air temperature as the outdoor air temperature dropped. This tended to compensate for increased radiation loss from the human body to the cold surfaces of the building, an important consideration in structures with large window areas. This same effect has more recently been achieved using simpler, less complicated controls which do not contain electronic components. Furthermore, the control application has been modified to improve heating system response.

Humidifiers

Humidifiers are another system component which have changed during the last few years. As was the case with both air cleaning devices and control systems, humidifiers of various degrees of effectiveness are now available. These include electric humidifiers which may be installed in the plenum of the furnace. Another type atomizes the water and injects it into the supply air system in a spray of invisibly small droplets. In some cases, these humidifiers which provide for the positive addition of moisture are so effective that control by means of a humidity controller is extremely desirable. After all, humidity is necessary for comfort, but too much moisture can cause structural damage to any building.

Duct materials

The use of new materials for ducts is becoming increasingly common. These include insulating materials, plastics, and fibers, as well as new metallic products. Even though each of these materials has certain desirable properties for specific applications, there is no one material, either old or new, which is the best one available for all applications. Some of the new materials, for example, have good insulating properties, but insulating duct-work is neither necessary nor even desirable under all circumstances. Other materials are designed for use where flexibility is desirable, and this certainly makes installation easier under certain circumstances. Generally speaking, therefore, there is no single recommendation that can be made concerning the type of duct material which should be applied or the single type of duct material which is best. All, from galvanized sheet steel, perhaps the traditional

material, to the newest one, whatever it may be, have their place.

Supply outlets

Supply outlets have not yet been mentioned, and they must be, for here too there have been advances. There is an increasing consciousness by diffuser manufacturers of two things—first performance requirements for supply outlets, and second the appearance of their products. The first of these, performance, has resulted in more complete information on the pressure loss, throw, and spread characteristics now available. Additionally, better guidance is being given to the installer on the application of specific types of outlets.

Increased consciousness of styling and pleasing appearance has resulted in the use of totally new materials in construction of diffusers. Most striking, perhaps, are the development of extruded aluminum diffusers and the application of anodizing the aluminum so that the outlets become a part of modern interior decoration. Obviously, the use of extruded and anodized aluminum grilles is limited primarily to the commercial and industrial field.

Systems

So far, we have talked about equipment and components—we have not talked about systems. In a sense, the system is far more important than either equipment or components, but is far more difficult to discuss constructively. There are a few generalizations which can be made, however. Foremost, among these is the fact that the air system is being applied in a much greater variety of installations than ever before. For example, it is receiving increasingly greater acceptance in apartment buildings, school buildings, and commercial structures. There are several reasons for this, and the reasons vary with the type of application.

In apartments, for example, a very common approach today is the use of individual heating units and systems for each apartment. This is brought about partly by the need for air-conditioning in apartments, definitely a competitive factor from the standpoint of the landlord. Another consideration, however, is the desire by landlords for individual tenant operation and tenant responsibility for all utility bills including heating.

Schools

In schools, we find an increasing awareness of the fact that the flexibility and response characteristics of air systems assure the type of control necessary for maintaining proper conditions within the classroom. Children are easily distracted, and the right combination of temperature, air circulation and air freshness are essential if our children are to benefit fully from their educational experiences. Furthermore, we tax payers have learned the hard way that a school building is not a static thing—it needs to be expanded continually to keep overcrowding to a tolerable minimum. One of the problems involved in adding to any existing building is the extension of utilities, and the ever-present possibility that existing utility systems will have to be drastically and expensively enlarged in order to satisfy the requirements of the new portions of the structure. This has been minimized, insofar as heating is concerned, by the use of air systems in which one heating unit serves either an individual classroom or two adjacent classrooms. This approach also provides for flexibility of control and the fact that heating requirements vary drastically from one room to another at different times of the day. These are "plus value" features, and are an addition to the inherent control and response characteristics of air systems.

The same results can be obtained by using a larger capacity, centrally located furnace in an addition to a school building. In this case, a zone-controlled system must be used, and provision for introducing fresh air into each room must be included in the system design. This is not at all difficult to do and, furthermore, it provides the same high degree of comfort without extending or over-taxing an existing heating system. In addition, if supervision of heating equipment is required for some reason or another, it is obviously more economical to provide for this on a central basis than on an individual basis. Generally speaking, however, the supervision required for automatically-fired units is nominal, and maintenance can be handled most satisfactorily on a scheduled basis.

One type of duct system now used in school installations is the embedded-duct perimeter system. In some installations of this type, the duct is embedded near the perimeter of the building whereby fresh air is introduced through the furnace, and control is achieved on the basis of one furnace per exposure. In other applications of this type, trunk ducts are located underneath the floor of the corridor and branch ducts serve each room. The trunk ducts are often installed in pairs—one carries heated air and the other carries unheated but filtered ventilation air. Mixing dampers, controlled by the room thermostat, adjust the proportions of heated and ventilation air required for the room. The novelty of this type of installation is that the ducts are embedded in the floor in order to provide warm floors. This is in addition to the uniform room-air-temperature provided by the perimeter introduction of conditioned air.

The principle upon which this system is based is certainly not new, for the dual-duct system is commonly used in commercial buildings of many types. In fact, many of the so-called high velocity or high pressure systems use this same approach. Even though their design is well beyond the scope of our discussion, I must point out that these are often systems of a proprietary nature and their design involves many special

(Continued on page 16)

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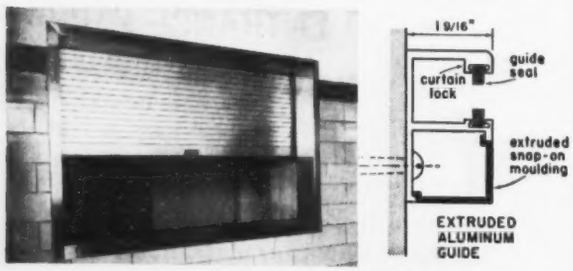

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NEW AIR HEATING METHODS

(Continued from page 15)

considerations including ducting, sound attenuation, etc.

It is obvious, that the increasing acceptance and need for air-conditioning has accelerated the acceptance of air systems in all types of structures, from the smallest residence to the largest commercial structure. Some will claim that the systems used in some of the larger structures are not air systems in the complete sense of the word. They are exactly this, in fact, even though the heat source may be something other than a direct-fired furnace. It is rather difficult to generalize on some of these things, but the fact remains that a modern office building has installed in it a great deal more air distribution equipment, including blowers, ducts, grilles and filters, than did buildings of a few years ago. Furthermore, all of the factors in the definition of comfort air-conditioning—temperature control, air distribution, cleanliness and humidity control—are considered in the design of systems for these buildings.

Heat pumps in office buildings

Another interesting approach has been the application of the heat pump in office buildings. In modern, glass-walled office buildings, we generally find about three distinct and separate zones. One of these is an exterior zone on the sunny side of the building, and during almost any season of the year this zone will require cooling, provided of course, that the sun is shining. Then there are the interior zones—those not affected directly by sunshine. These may require heating or they may require cooling, but in any case, the heating load will be very low and will be supplied primarily from lights, occupants, and other internal sources. As a matter of fact, cooling may be required in them, as in sunlit exterior zones. Exterior zones on the shady side of the building, on the other hand, will require heating under most circumstances. The heat pump has been applied in this type of installation to cool the sunny exterior zone which requires heating. Of course, this is a grossly simplified explanation of what is done, but the principle is one which tantalizes the imagination.

Air curtain

Another unique application of air circulation is the air curtain. This is literally the use of air in place of a door and in such a way that the infiltration of unheated outside air or exfiltration of heated indoor air is minimized. In general, this is accomplished by delivering air downward across the building entrance from grilles located above the doorway. This air is then collected in grilles located at the threshold. Although most commonly used in high-traffic-density entrances in one-story buildings, they have been used in multi-story buildings also.

Careful design is a must. Wind can break through the curtain, and the chimney or stack effect of multi-story buildings can be a problem during the winter. Dirt collected by the sidewalk level intakes must not interfere with the operation of the curtain. These problems are not overwhelming, however, for they have been satisfactorily solved in most instances. Nevertheless, the application must be carefully designed.

Despite all these advances and developments in the application of air systems to commercial and industrial structures, the greatest and most encouraging development is in the residential field. During the last several years, great changes in concept of the system have occurred. We have seen perimeter heating and cooling all but replace other types of systems in most parts of the country. Investigations show that in most instances the results obtainable with perimeter systems are so far superior to those obtainable with other types of systems that this change is fully justified. On the other hand, we must not forget the conditions under which any residential heating system is installed if we are to view prospects for its performance realistically.

We must remember that the heating system is unlike any other component which goes into a residence. This system is literally manufactured on the job. The furnace, the controls, the supply outlets, the ducts, and all the other things which go into the heating system are solely components. None is a finished product. As a matter of fact, each of these things, despite its mechanical complexity and initial cost is no more a finished product than is a 2x4 16 feet long. In this respect, the heating industry is a far different thing than the appliance industry, and any one who attempts to buy heating as he buys an appliance such as a stove or refrigerator asks only for trouble.

The big change, the big forward step in heating, is this increased awareness of the system by the home owner, the builder, the heating and air-conditioning contractor and the manufacturer. Without this awareness, no other progress would be possible either now or in the future. With this awareness, the door is open to progress at all levels within the industry.

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RADIANT SYSTEMS FOR HEATING

by J. Raymond Carroll, PE, Associate Professor of Mechanical Engineering at the University of Illinois at Urbana. Speaking before the 1959 Washington Conference of the Building Research Institute, Professor Carroll emphasized that in an era of scientific gadgetry, the public has come to expect parallel scientific innovations in systems of heating. He provides a comprehensive review of the subject of radiant systems.

In this era of scientific gadgets, it is only natural that the public should expect amazing scientific advancements in heating. In the modern home we can expect to find refrigerators styled as buffets and room dividers, and operating on the thermoelectric principle rather than with conventional compressors. The thermoelectric dehumidifier, the electronic range, and the ultrasonic dishwasher are all devices that are presently available. Is it any wonder that the public also demands modern heating systems with the scientific sounding title, "Radiant Heat?"

On the other hand all of these devices have been perfected within the last few years as a result of recent scientific advancements whereas radiant heating is a very old and established method of heating.

It is true that thermal radiation plays an important part in the comfort picture. However, we should not forget that it is the human that must be made comfortable and not the house; and no matter what form of heating system may be used, the human must lose heat by convection and by evaporation to his surroundings, as well as by direct radiation.

Comfort implies more than just warmth. Air temperature and surrounding surface temperatures are important but air motion, air cleanliness, and air humidity are also vitally important to an optimum sensation of comfort and well being. These cannot be sacrificed for warmth alone. Therefore, the basic problem is to place the human in an environment that is conducive to warmth *and* comfort. The necessary environs will change as the state of health, clothing and activity change. Naturally, a warmer surrounding is required in a residential area of undress (such as a bathroom) than in an industrial area where increased bodily activity is required. What may be desirable for one type of space may not be acceptable for another.

Definition

Radiant heating is defined in the *ASHAE Guide* as "a heating system in which only the heat radiated from panels is effective in providing the heating requirements." This is rather restrictive, but it does indicate that only the radiant heat component from the heat source is considered useful in producing an acceptable environment. If the heat source has any convection heat loss, it is not considered useful within the occupied space.

Panel heating is defined in the *ASHAE Guide* as "a heating system in which heat is transmitted by both radiation and convection from panel surfaces to both air and surrounding surfaces." This is also rather restrictive, but it does indicate that both the radiation and the convection heat loss from the heat source are contained within the enclosure and both directly serve to produce an acceptable environment within the occupied space. It should be noted that this principle and definition applies to most every heating system known. There are some minor differences in percentages of the radiation and convection components, but the basic principle and definition applies in any case.

Nature of radiant energy

Energy is continuously radiated from all matter whose temperature is higher than absolute zero (−460° F). The rate of emission depends upon the temperature and the nature of the matter. Energy is radiated from every point of every surface in straight lines in all directions at a velocity of 186, 284 miles per second (in vacuo). It does not require the presence of any matter for its transmission. For example, the earth receives radiant energy of widely varying wave lengths from the sun even though separated from it by an almost perfect vacuum.

Radiant energy is propagated in waves over a wide range of wave lengths that are distinguished by such terms as radio waves, heat, light, x-rays,

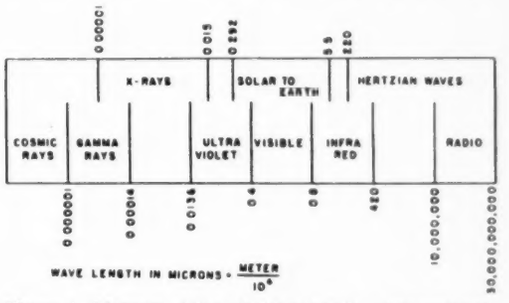

Figure 1. Diagram of the electromagnetic ether spectrum.

etc. Fig. 1 shows the electromagnetic ether spectrum as divided according to these classifications. In the range between about 0.4 and 0.8 microns (a micron is a unit of wave length equal to one-millionth of a meter) the human optical nerves are so tuned that the radiant energy appears as light. The longer wave lengths, up to 420 microns, form a part of the spectrum called the infra-red. This range is commonly called radiant heat since the radiation within this range that is absorbed by a body appears as an increase in sensible heat.

Since infra-red thermal radiation is an electromagnetic phenomenon, it can be analyzed in terms of wave motion. It has been found experimentally that for each temperature and wave length there is a maximum intensity of radiation that is not exceeded by any surface. The curves representing this maximum intensity of radiation for a "black body" at four different temperatures are given in Fig. 2[1] and are derived from what is known as Planck's equation. It may be seen from Fig. 2, that as the temperature is lowered the energy distribution curve, and the position of maximum intensity for each curve, is shifted to the right. This shift of the position of maximum intensity follows a well established law called Wien's displacement law which can be used to determine the wave length corresponding to this position for any particular temperature. The

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RADIANT SYSTEMS FOR HEATING

(Continued from page 17)

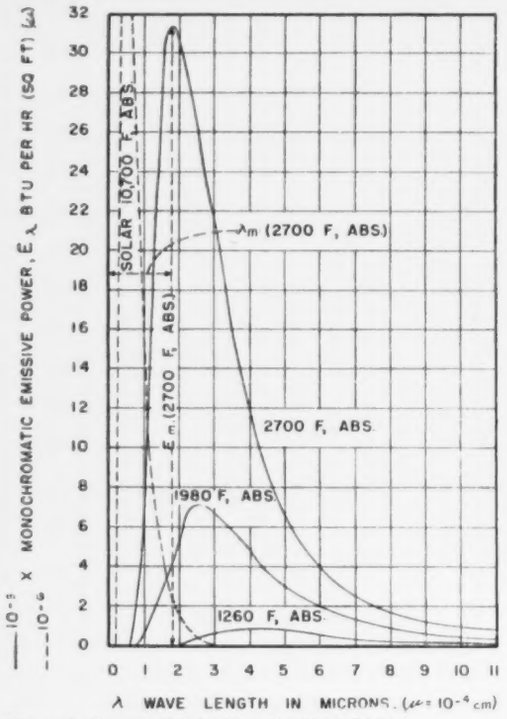
MONOCHROMATIC EMISSIVE POWER, E λ BTU PER HR (SQ FT) (μ)
SOLAR (10,700 F, ABS.)
λm (2700 F, ABS.)
E (2700 F, ABS.)
2700 F, ABS.
1980 F, ABS.
1260 F, ABS.
λ WAVE LENGTH IN MICRONS. (μ = 10⁻⁴ cm)

Figure 2. Energy distribution of a black body.

wave lengths of the radiation from the sun are relatively short and have a maximum intensity at about 0.48 microns (which is the wave length of blue light). A surface at about steam temperature will have most of its energy radiated at wave lengths around 8 microns, which is well into the infra-red. The radiant energy emitted by surfaces at lower temperatures such as are used in hot water heating or in panel heating (approximately 100° F to 200° F) is by no means comparable to that given off by the sun, being of extremely low intensity (not large enough to show in Fig. 2) and having wave lengths toward the upper extreme of the infra-red region. There are no "healthful ultra-violet waves" involved in radiant heating. In fact, the radiation from a common steam or hot water radiator is of higher intensity and contains shorter wave lengths than the radiation emitted by a conventional ceiling or floor panel system.

According to the Prevost theory of energy exchanges, all bodies at temperatures above absolute zero are continually radiating energy to their surroundings, even though at the same time they are absorbing more energy than they emit. For practical purposes, it is the net exchange of radiant energy between a body and its surroundings that is significant.

Upon encountering any matter, radiant energy may be partly absorbed and converted into heat; it may be partly reflected; or it may be transmitted through the matter. The hypothetical body whose surface would absorb all of the radiation incident upon it is called a perfect absorber or a "black body" and hence, according to Kirchhoff's law, it would also be a perfect emitter. This is the theoretical body depicted in Fig. 2. There is no existing surface that emits as much radiant energy as a perfect radiator (black body).

Type of surface	Emissivity e	Degrees F	Reference
Asbestos board	0.960	74	B
Asbestos paper	0.930	100	A
Black body (theoretical)	e = 1.000 at any temperature		
Brick, rough	0.930	70	B
Carbon, lampblack 0.003 in. min.	0.945	100	A
Enamel, white fused, on iron	0.897	66	B
Glass, smooth	0.900	100	C
	0.937	72	B
Marble, light gray, polished	0.931	72	B
Oak, planed	0.896	70	B
	0.910	100	C
Paints:			
Acetylene soot	0.990	125	C
Aluminum (values vary with amount of lacquer body and age)	0.270 0.670	212	B
	0.650	100	C
Black lacquer	0.800	100	
	0.950	200	A
	0.800	125	C
Bronze	0.510	100	C
Flat black lacquer	0.960	100	
	0.930	200	A
Lampblack	0.960	125	C
Oil paints, all colors	0.920 0.960	212	B
	0.920 0.950	200	C
White enamel	0.920	125	C
White lacquer	0.800	100	
	0.950	200	A
Plaster, rough lime	0.910	50 190	B
	0.910	100	C
Porcelain, glazed	0.924	72	B
Metals:			
Aluminum, polished	0.040	100	C
Aluminum, rough	0.055	78	B
Aluminum, oxidized	0.110	100	C
Brass, polished	0.096	100	A
	0.050	100	C
Brass, oxidized	0.610	100	C
Silver, polished	0.022	100	A
	0.010	100	C
Steel plate, rough	0.945	100	A

King—"At ordinary temperatures, most non-metallic solids, such as porcelain, glass, paper, cloth, building materials and enamels and paints of any color, have emissivities in the neighborhood of 0.90 to 0.95."
A—Hellman—from original investigations.
B—McAdams—compilation of results of various investigators.
C—Croft—compilation of results of various investigators. Other sources, such as the International Critical Tables and various articles on radiation, were investigated but the deviation from the above main sources was so slight that they were not included.
The above values for emissivity are not correct when referred to solar radiation since the color of the surface is then an important factor in determining the e value.

Table 1. Emissivity of miscellaneous surfaces

Emissivity, "e," may be defined as the ratio of the rate at which a given surface emits or absorbs radiation to the rate at which a black body at the same temperature would emit or absorb radiation. Or, it may be thought of as its efficiency in its ability to emit or absorb radiation. The "e" of most surfaces is not constant but increases with an increase in temperature. Values of "e" for some of the common building materials are given in Table 1. According to the Stefan-Boltzmann equation, the total rate at which any body at any temperature emits radiation of all wave lengths is represented by the area under the intensity wave length curve times the emissivity of the body.

If two surfaces are separated by some non-absorbing medium, the net rate at which surface 1 will lose heat by radiation to surface 2 is equal to the rate at which surface 1 emits radiation, minus the rate at which it reabsorbs the fraction of the radiation that is reflected back to it by surface 2, and minus the rate at which it absorbs the radiation emitted by Surface 2. If it is assumed that all of the radiation emitted by the surface 1 falls upon surface 2 and surface 2 is large in comparison with 1 and approaches a black body, then the rate at which surface 1 reabsorbs the fraction of the radiation that is reflected back to it by surface 2 is zero and the net rate at which surface 1 loses heat by radiation is:

$q_r = 0.173 \times 10^{-8} \times A_1 F_s F_e (T_1^4 - T_2^4)$ where

q_r = net exchange by radiation, Btu per hour
0.173×10^{-8} = Stefan-Boltzmann radiation constant, Btu per (hour) (square foot) (degree Fahrenheit absolute temperature)
F_s = shape factor, dimensionless
F_e = emissivity factor, dimensionless
A_1 = area of surface 1, square feet
T_1 = absolute temperature of heated surface 1, degrees Fahrenheit absolute
T_2 = absolute temperature of surface 2 (MRT of unheated surroundings), degrees Fahrenheit absolute.

The shape factor (angle factor, configuration factor) F_s accounts for the shape and relative position of the two surfaces. It is a measure of the amount of radiation emitted by surface 1 which actually impinges on surface 2. In a closed building all of the radiation emitted by the heating element is assumed to be intercepted by the surrounding room surfaces and therefore $F_s = 1$.

The emissivity factor, F_e, accounts for the emission, reflection and absorption characteristics of the two surfaces involved, as follows:

(1) for a small body in a *large* complete enclosure, use the emissivity of the small body only:

$F_e = e_1$.

(2) for a *large* body in a complete enclosure, use the emissivities of both bodies:

$$F_e = \frac{1}{\frac{1}{e_1} + \frac{1}{e_2} - 1}$$

An average emissivity value to be used in panel heating is somewhere between the above two cases. The panel is neither a very small enclosed body nor is it a very large enclosed body. If it is assumed (from Table 1) that the emissivity of all common building and finishing materials is equal to 0.93, then e_1 is larger than F_e which is larger than

$$\frac{1}{\frac{1}{0.93} + \frac{1}{0.93} - 1} \text{ or } 0.87.$$

Since F_e is somewhat between, it is generally assumed that $F_e = 0.90$.

The mean radiant temperature (MRT of the unheated surfaces) is the imaginary, uniform surface temperature of a large enclosure with which the heating element would exchange the same amount of energy by radiation as in the actual room which has a non-uniformly heated inside surface. Numerical evaluation of the theoretical MRT is very difficult for an actual enclosure since there are many factors other than surface temperature which are found to affect it. If it is assumed that the room is large and that the surfaces are made of materials having emissivities of 0.90 and above, the radiant energy exchange may be considered approximately the same as if all of the surfaces were black bodies. The MRT

is then a function of the various shape factors involved and is meaningless unless the reference is to a specific point or place in the room, since the shape factors change as the position of the body or surface changes. If it is assumed that all infinitesimal areas have the same shape factor with respect to the heating element and that the shape factors of finite surfaces are proportional to their areas, then an approximate value of the MRT can be obtained. In order to avoid confusion between the theoretical MRT and the approximate MRT, the term average surface temperature (AST) has been used and is defined as follows:

$$AST = \frac{A_1T_1 + A_2T_2 + A_3T_3 + \text{——}}{A_{total}}$$

This is generally used instead of MRT because of its simplicity.

Radiant effect on comfort

Radiant heating is a term that should be reserved to define those types of heating elements and systems in which only the heat radiated by the element is effective in producing comfort or warmth. The convection heat from the element is basically lost from the system and does not serve to provide useful heat within the living zone. It is interesting to note that a residential ceiling panel may emit as much as 70 per cent of its total heat by radiation and yet the net heat transfer effect within the room is approximately the same as with any other conventional system. This is due to the primary and secondary convection currents produced within the tightly enclosed and small space. On the other hand, a large open industrial type area does not receive heat by convection from the "radiating panels" and therefore is more properly referred to as true radiant heating.

It is almost impossible to introduce heat into a building by radiation alone and not to utilize secondary radiation and convection from other surfaces. Some radiation will be received by the occupants but the larger proportion will be received by the building walls, floors and furnishings, thereby raising their inside surface temperatures. This surface temperature increase allows for less body radiation loss to these cold surfaces and also allows for convection heating of the surrounding air.

Various physiological investigators[2] [3] have reported on attempts to correlate the radiation exchange and the convection exchange of the human body with its surrounding into a simple comfort equation. All of these equations include an expression for air temperature and for mean radiant temperature. As the mean radiant temperature is increased, the ambient air temperature must decrease in order to maintain a constant sensation of warmth However, practically all of the physiological research has been done at usual room air temperatures or higher. Practically none has been done at low room air temperatures and high mean radiant temperatures.

Another problem is that an accurate instrument to measure comfort in an actual installation has not been invented. The globe thermometer and the thermal eupatheoscope are both excellent approaches to the problem but are not accurate or sensitive to widely varying air velocities and do not record directional effects of radiation. Unequal radiation exchange from different directions can be extremely annoying and uncomfortable. The human is quite sensitive to radiation loss or gain and particularly around the face and the back of the neck and hands.

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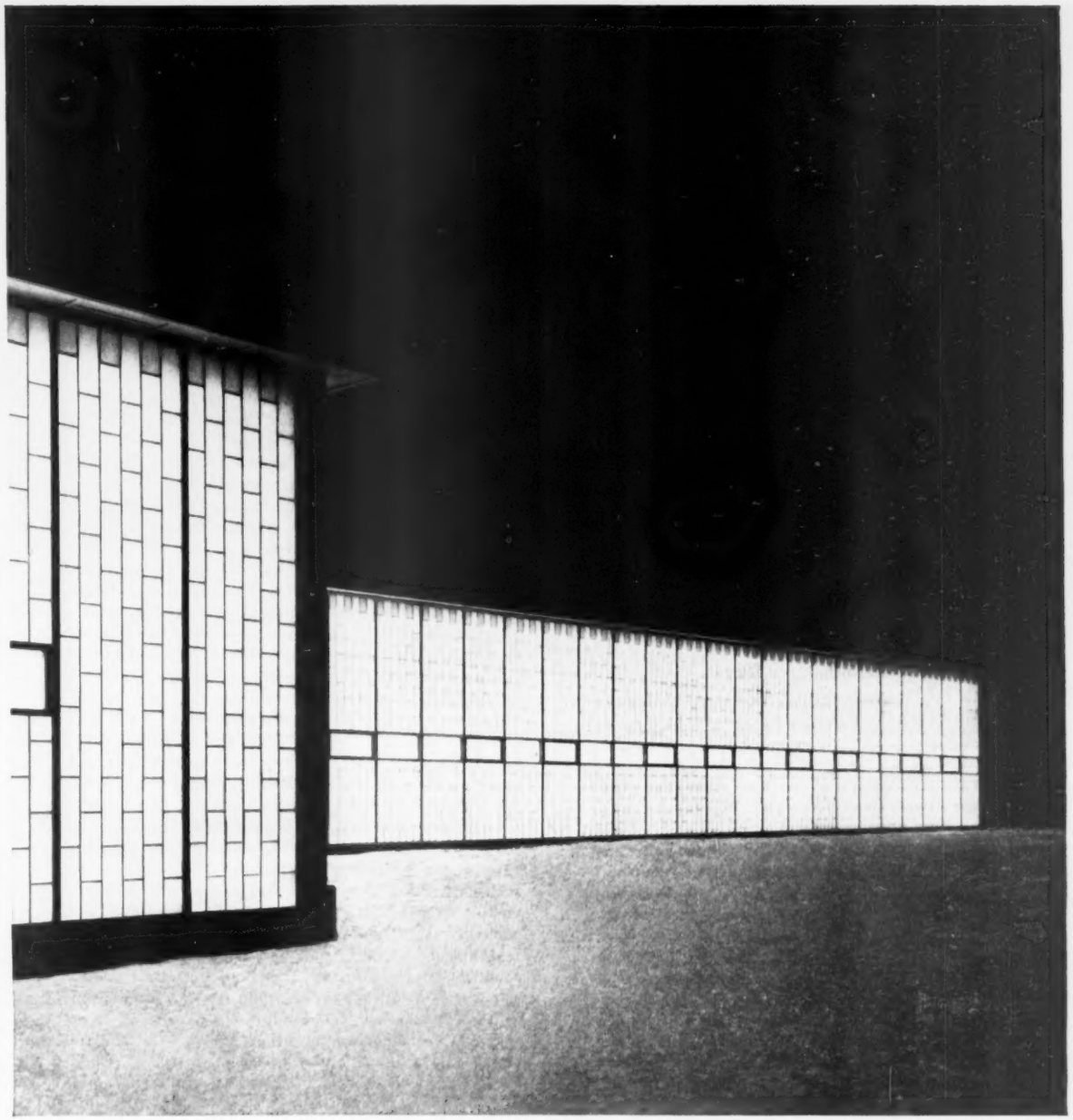


Only 113 Kalwall panel units were needed to enclose the entire Edburgh Manufacturing Corporation plant in Newburgh, New York. Architect: Ian M. Horne, East Orange, N. J.

it's a Kalwall translucent factory

and it costs less to light . . . less to heat . . . less to build

No supporting framework . . . 1000 sq. ft. of wall area enclosed per day . . . the highest insulation value of any light transmitting material . . . and an installed cost less than any other window wall system. These are just a few of the revealing figures on this Kalwall translucent factory at Newburgh, New York. For full details on the Kalwall Panel Unit Wall system, write:

Kalwall Corporation, Dept. AE, 43 Union Street, Manchester, New Hampshire

Circle 110 for further information

RADIANT SYSTEMS FOR HEATING

(Continued from page 19)

Such an uncomfortable environment could easily be created with radiant heating unless adequate consideration is given to the size and distribution of the heating elements. On the other hand, there have been various studies through the years that indicate a certain "freshness" associated with an environment in which the MRT is in excess of the air temperature.

Dr. Bedford [2] expresses the general requirements for optimum comfort as follows:

1. A room should have as low an air temperature as possible, and still be warm.
2. There must be general air motion, but not local drafts.
3. The air motion should be variable rather than monotonous.
4. The relative humidity should be less than 70 per cent as an extreme maximum.
5. The surrounding surface temperatures should be higher than the air temperature.
6. The air at head level should not be warmer than near the floor, and the heads of the occupants should not be exposed to excessive radiant heat.

The problem is to create an environment in which the MRT is higher than the air temperature, and to do so without uncomfortable directional radiation effects, and with a gentle air motion, and without air stratification.

Low temperature radiant heating

The low temperature systems are those commonly called panel heating. They usually consist of floor or ceiling surfaces warmed by embedded hot water pipes, warm air ducts, or electric coils. The surface temperature is usually not uniform since the pipes or coils are spaced on various center to center dimensions depending upon the material in which they are buried. There are some electrically conductive films and elements that have uniform surface temperatures since the entire mass becomes a simple resistance element. However, in most cases, the surface temperature of the typical panel is not uniform. A floor panel usually has a design uniform surface temperature of approximately 85° F with small area hot spots of approximately 95° F to 105° F. A ceiling panel usually has a design uniform surface temperature of 110° F to 120° F with small area hot spots of approximately 130° F to 140° F. The type and quantity of heat emitted to the room is strictly a function of the surface temperature of the panel and is not a function of the method of warming the panel. It is interesting to note that warm air floor panels are used extensively (particularly in commercial and public buildings) since air-conditioning can be easily combined with the heating system.

The floor panel emits approximately 25 to 40 per cent of its total heat transfer by radiation. The ceiling panel emits approximately 60 to 75 per cent by radiation. The room air temperature in a typical closed room is the same as in any other conventional system, except that the temperature gradient from floor to ceiling is very uniform and less than with other more conventional systems. The floor panel has a characteristic time lag due to the mass of the panel. The ceiling panel has less time lag than a floor panel but it does not have the ability to counteract cold air downdrafts and infiltration at large glass areas. A frequent complaint of panel systems is that the room air tends to stagnate for lack of air motion. Odors tend to linger, and cigarette smoke hangs in the air. In any case, with proper controls, panel heating will produce a reasonably uniform and comfortable environment in most modern homes if they do not have excessive glass exposures.

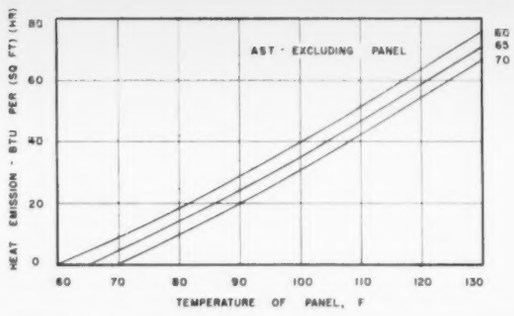


Figure 3. Radiation equation for heat transfer in panel heating surfaces.

The radiation equation computed for F_e of 0.90 and for panel heating surfaces between 60° F and 130° F radiating to surroundings at 60° F to 70° F is given in Fig. 3 [4]. For practical purposes, however, it is the total heat from a panel that is of interest and this is a combination of radiation and convection heat transfer. The convection heat transfer for "still" air conditions has been discussed in a previous paper.[5] It depends upon room air velocity and temperature and upon the relative position of the panel; that is, floor, wall, or ceiling.

Natural convection heat transfer has the largest value for a floor panel. Since the radiation heat transfer does not depend upon the position of the panel, the total heat transfer from a floor is larger than that from a ceiling; both operating at the same temperature. A ceiling panel, however, can usually be operated at a higher temperature than a floor panel and therefore gives the greater heat transfer rate under operating conditions. It should be observed that the theoretical values used for the convection heat transfer in preparing these curves are probably slightly lower than those found in actual installations. This is due to the fact that still air conditions have been assumed and in actual operation there is always a variable air motion present that will increase the actual heat transfer rate. However, considering the other variables in the solution of the usual building heating problem, these curves are well within the accuracy required.

Medium temperature radiant heating

The *medium temperature systems* are those commonly called conventional heating. They usually consist of radiators, convectors, baseboards, finned tube, panels, and pipe coils operating at approximately 150° F to 250° F. The heating medium is usually hot water or steam, although there are some electrically conductive film type heaters and panels that operate at surface temperatures from approximately 100° F to 200° F. The electric panels (about 3 feet by 2 feet) are usually made like pictures or mirrors to hang on the wall and are usually rated at about 1,000 watts. (The idea of looking into a hot mirror is intriguing.)

In most cases, since the heating element is located within the living zone and since the temperature of the element is fairly hot to touch, the heat transfer device is designed to transmit a large percentage of heat by convection. The one notable exception is the cast iron baseboard which is purposely designed to minimize the convection component and to spread-out the radiation heat emission along a long length of wall surface. The purpose is to counteract body radiation heat loss to large cold glass areas and to also provide sufficient convection currents to counteract cold downdrafts. The cast iron baseboard, and its very close counterpart the electric glass baseboard, are excellent solutions to large cold glass problems. The finned tube type baseboard, and its counterpart the electric convector baseboard, are also suitable for most usual applications under large glass areas unless the output per lineal foot becomes so high that the element length becomes too short to effectively serve the entire glass length.

The electrically conductive glass panels are usually rated at approximately 1,000 watts and have surface temperatures up to approximately 310° F. These are usually wall panels and have a high convection component as well as radiant. They tend to create a hot spot because of their high surface temperature and they restrict the placement of furniture or draperies in many cases. However, they are finding acceptance where other types of elements are not suitable and where a definite directional radiant effect is desired.

High temperature radiant heating

The *high temperature systems* are those commonly called high temperature radiant heating. They usually consist of pipe coils, radiators, or panels operating at approximately 300° F to 1,000° F. The heating medium may be high temperature water or steam, or direct fired surfaces such as gas or oil combustion chambers. Electric panels do not usually operate in this range although they could if the need existed. The heating element is always either concealed as in a convector cabinet, or it is hung overhead, since it is too hot to touch or to place exposed within the living zone. Most of these systems operate from overhead and approach a true radiant system since the convection loss from the element is usually not effective in producing comfort within the occupied

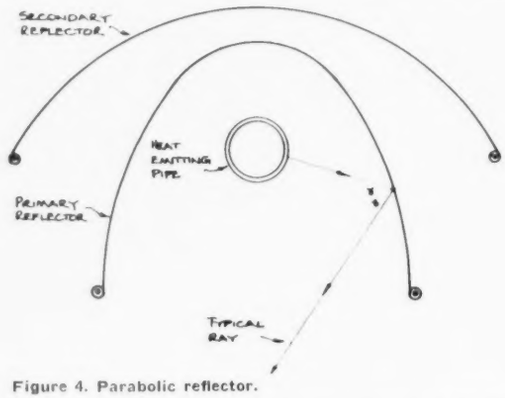


Figure 4. Parabolic reflector.

zone. The pipe coil Fig. 4 usually consists of single pipes spaced throughout an area to simulate the same method of radiant heat distribution as a fluorescent lighting system. The radiator and panel systems usually attempt to spot the individual elements so that critical areas are covered with radiation from all directions to minimize the directional feeling that a single element would provide. This is similar to general lighting with multiple incandescent bulbs

The direct fired gas radiators usually operate at approximately 600° F to 900° F surface

temperature. Since these elements tend to be relatively big and bulky, they usually have shields or fins to prevent excessive convection heat losses. They should be mounted relatively high (fourteen to sixteen feet) since they are big and emit a large quantity of heat. They tend to produce uncomfortable hot spots if mounted low. However, they form a simple and convenient way of heating large relatively open areas without any electrical connections. Also, their products of combustion are usually discharged to the outdoors rather than within the building as with open-flame types.

Overhead panels are susceptible to large convection losses depending upon their orientation and design. On the other hand, with proper baffling and orientation the convection loss can be substantially decreased. However, the fuel economies usually claimed or implied for such systems have not been adequately substantiated. There has been some recent work on this type system and some design methods have been presented. White[6] presented a design method in 1952 based upon the use of the globe thermometer which together with Bedford's comfort equation allowed the panel temperature to be calculated. Seal [7] has recently simplified this work in certain cases by using photometric methods. Kell[8] has offered some data on heat emission from panels in various positions. However, due to a lack of design refinement and research data for this type system, the steady state heat loss is usually the basis for calculation. French engineers have recently offered some information[9] [10] indicating fuel savings are possible with proper design, and a design method by Missenard[11] has been presented for horizontal overhead panels that indirectly warm the floor.

Specular radiant heating

The *incandescent systems* are those known as specular radiant heating. They usually consist of small incandescent elements or panels operating at 1,000° F to 2,000° F. In most cases shields are provided to control the direction of radiation, and in some cases parabolic reflectors are provided to concentrate the radiation to a specific area. This is similar to spot lighting. Most of these elements are electric and are relatively small and inexpensive to purchase. They are used extensively for spot heating in both light and heavy industry and in many commercial areas. Since their convection loss is very small, they are frequently used outdoors for spot heating. Their efficiency of utilization of energy is quite good since their convection loss is small; their lag is very small; and the parabolic reflector allows the radiation to be concentrated where desired without wastage. So far, they are not used for general building heating to any extent because of the large number required and the general high cost of electricity. However, this may change drastically as the relative cost of electricity is reduced.

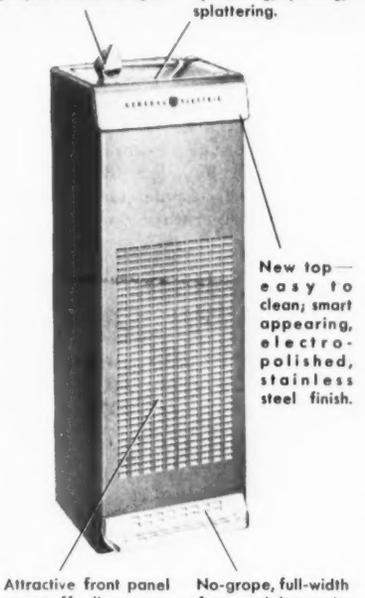
The open-flame gas type heater that heats a ceramic element until it glows red hot has had some limited use in heavy open-type industries. The convection loss is entirely wasted and the products of combustion remain within the enclosure until they are diluted with exhaust air[12] or are wasted to the upper open area of the building. However, in certain types of open-air buildings, the electric or gas incandescent element is the only logical way to provide warmth and still not waste heat trying to warm the air.

One of the characteristics of any true radiant

(*Continued on page 22*)

A feature-by-feature review of General Electric water coolers shows it pays to . . .

LOOK BEYOND THE OBVIOUS


No-squirt bubbler maintains continuous, proper stream height.
Anti-splash basin is designed to prevent splashing, spilling, splattering.
New top—easy to clean; smart appearing, electro-polished, stainless steel finish.
Attractive front panel snaps off; allows easy access to controls.
No-grope, full-width foot pedal permits easy water control.

At first glance, all water coolers may seem alike. But it will pay you to take a closer look at General Electric water coolers. Only General Electric coolers offer you TOTAL VALUE—a combination of product features and back-up services that give you *more* than just a water cooler. For instance:

Design Features—General Electric water coolers are built to last. You get style leadership, and compact, sturdy design. The features shown at left are typical. Others include: Easy-to-dial water temperature control and a hermetically-sealed refrigeration system that is lubricated for life.

Economy—13 models (including hot-and-cold, pressure and bottle-type models) are moderately priced. Operating costs are negligible.

Availability—Just check the yellow pages for your General Electric water cooler distributor. He can deliver the units you need immediately.

Warranty Protection—A written one-year warranty on all parts and five-year replacement agreement on the refrigeration system help you avoid major repair costs. Also, nationwide General Electric Service Centers are always close at hand.

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RADIANT SYSTEMS FOR HEATING

(Continued from page 21)

system is that all surfaces that "see" the element receive heat directly by radiation and become warmer because of it. This includes the human being that is walking around. Since the quantity of radiation received varies inversely as the space of the distance, the human feels a different reaction to each radiant element as he walks under it or within its area of influence. Of course, this could be accounted for by proper design and by using a very large number of radiant elements. However, this is not the usual case. Therefore, so far, the true radiant systems are known to be "spotty" and "directional." This is probably a characteristic that will tend to be eliminated by good design as these systems are used more in the future. And, of course, with increased usage will come application and experience data to aid in better installations.

Future

Before we can logically discuss the best place for radiant heating in the future, we must first limit our discussion to specific classes of activities or occupancies.

Obviously, the home is a class of building all its own. The freedom of dress, of activity, and of building construction and design are unique. Every home can be different and yet they all have the same basic elements relating to comfort. The human is in close proximity to the walls, glass and ceiling at all times. These surfaces can be, and frequently are, at a lower temperature than the body. The internal heat sources due to people and lights are small. Therefore, the human frequently experiences sensations of chilliness due to excessive body radiation loss during cold weather. Fortunately, he has freedom to change position and dress and can minimize the uncomfortable effects. This allows him considerable latitude in the method of heating and he usually bases his choice of system on minimum cost.

The office building is another structure in which the human frequently must live and work in close proximity to cold wall and glass areas. In this case, however, he is limited as to both activity and dress. In the past, practically every building was heated with exposed radiators or convectors below windows. Frequently, the result was very uncomfortable due to spotty placement of the radiators and the excessive localized heat emission from oversized elements. This has been corrected with baseboard or finned tube radiation. However, due to central air conditioning, many modern office buildings are being heated as well as cooled by central air systems without any radiators or convectors at the outside walls. This is very satisfactory for the people that work in the large areas of the interior, but for those that work along the exterior the results are anything but comfortable.

The commercial building is usually a large interior with only one or two walls that contain glass. Of course, there are any number of types and usages of commercial buildings but usually the occupants are not subjected to excessive body radiation loss. Therefore, a central air system is usually used for heating as well as for cooling. However, there are frequently localized spots such as show windows, check-out desks, entry area, etc., that are particularly difficult to heat because of the cold glass areas and cold infiltration air. Radiation, in one form or another, is usually used in these areas.

The industrial building is also possible of many variations. However the typical building is usually an uninsulated, one story, drafty building. The windows are single glazed and are frequently large in area to obtain maximum natural light. The roof is exposed and is usually either uninsulated or has a minimum insulation to prevent condensation or extravagant heat loss. The heating system is usually hot air from overhead unit heaters. The occupants are continuously subjected to excessive body radiation heat loss to the roof and to the walls. This is sometimes minimized by hot industrial processes or piping but in most cases the human is left to his own devices to be as comfortable as possible. This is the type of space in which high temperature radiant heating has had its greatest usage and general acceptance.

The open-air type of space cannot be forgotten since many industrial processes are conducted in this type building. Also, there is the outdoor space such as the football stadium which is not heated now but which will probably be heated in the future. Heavier clothing is the present answer to human comfort. Radiant heating will probably be the answer in the future.

Predictions and areas for development

The ever increasing use of glass in buildings and the trend towards outdoor and open air living will dictate the future use of radiant heating. Very small, unobtrusive, elements emitting high intensity infrared only could be mounted in the walls or ceiling around large glass areas to counteract body radiation loss to the cold glass area. At the present all types of radiators (steam, hot water, or electric) are at such low temperatures (150° F to 250° F) that their surface areas are excessive in order to control radiation.

In addition to the small high intensity infra-red emitter, all interior surfaces of buildings will be warmer. Naturally, one method is to use more insulation. However, this has been preached for years and it is not new. The next step is to artificially add heat to the interior surface of exterior walls. It is possible that future walls, floors and ceilings will have electricity conductive films embedded or adhered so that one or more of these surfaces may be varied in temperature as the exterior weather changes.

Other areas that have not been properly explored are the draperies, curtains and blinds around windows. Electric blankets have been successful for years. It should be simple to develop the electric drape. This would do much to solve the cold window problem.

Last, but not least, is the possibility of warming the glass itself. Since cold glass areas are the major concern, it is only natural that eventually we will be able to buy electric window glass. Perhaps it will be a plastic, but in any case it will be insulated against high heat loss to the outside by additional glass or plastic surfaces.

Outdoor living, and various commercial and sports events will definitely require radiant heating in the future. Outdoor theaters, porches, swimming pools, cafes, shopping centers, show windows, bus and transportation centers, drive-in theaters and restaurants, football stadiums, golf courses, gas stations, race tracks, snow melting and so on *ad infinitum*, are all future possibilities for specular radiant heating. The electric element and the gas-fired element are both practical in this case. The gas-fired element with parabolic reflector is particularly suited for immediate development for large area heating since gas is usually considerably cheaper than electricity in most areas today. On the other hand, the electric element has certain natural inherent advantages such that it is obviously the only answer in certain cases. Only time and inventive ingenuity will tell us where these two type of elements will fit into our future lives.

In all cases, it should be noted that the net effect of using radiant heating in buildings or in outdoor areas is to allow the human more comfort and warmth with less clothing. This allows for more freedom of movement and should increase general efficiency and comfort and safety in many industrial and commercial areas. How far we can carry the trend of more radiation and less clothing into open air sports and into private living remains to be seen. However, it should be re-emphasized that comfort does not depend upon radiation alone. A comfortable environment is one that includes a gentle but continuous air motion in order to control convection and evaporation losses. Since the modern home is a completely sealed and air tight building, some mechanical means must be used to create air circulation. And, since present methods of summer cooling also require mechanical air circulation, it is obvious that a combination of radiation control and air control will constitute the modern comfort control system of the future.

Acknowledgements

Particular mention should be made of the studies of Mr. H. G. Mitchell of London, England (now at the University of Minnesota,) and to Mr. John T. Cartland of Illinois, both former students at the University of Illinois. Mr. Cartland made some interesting studies of radiation distribution from an overhead high temperature source, and Mr. Mitchell did an excellent job in compiling and reviewing the available literature on the subject of high temperature radiant heating. It is interesting to note that most of the studies and investigations on this subject have been done in England.

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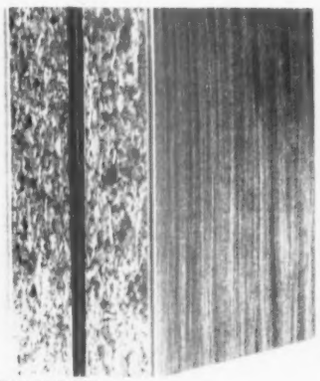
PRODUCTS, EQUIPMENT, MATERIALS

Report of recent developments by industry, based on data furnished by mfrs. Inquiry cards for further information face pages 1 and 50.



LOW COST ACOUSTICAL DOOR

MFR'S DESCRIPTION: acoustical door added to *Weldwood* line.

USES: interior soundproofing installations.

SPECS/FEATURES: certified by ASTM, door utilizes *Novoply*, three-ply board of resin-impregnated laminated wood flakes and chips, as sound reduction element. Photo shows construction of door skin, *Novoply*, damping material and air space. May be faced with variety of domestic or imported veneers; hung as any conventional door.

AIA FILE NO. 16-F

MFR: UNITED STATES PLYWOOD CORP.

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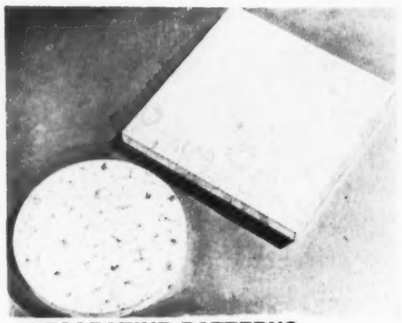

DECORATIVE PATTERNS INTRODUCED

MFR'S DESCRIPTION: two patterns added to *Accent* line of decorative artlay.

USES: restaurants, clubs and cocktail lounges.

SPECS/FEATURES: *High 'n Dry* presents tones of charcoal and red on antique white background; *Tea Time* has light green and gold tones on antique white. Both available in standard or post-forming grade materials for tables, counters and walls.

AIA FILE NO. 35-C-12

MFR: FORMICA CORP.

Circle 201 for further information

RESIDENTIAL ELEVATOR MODEL

MFR'S DESCRIPTION: addition to *Homelift* elevator line announced.

USES: residential installation.

SPECS/FEATURES: can be installed in new or existing homes. Interior is paneled in natural wood. Pushbutton controls in car and at each landing start, stop and summon car. Safety device keeps doors locked when car is in motion.

AIA FILE NO. 33-B

MFR: SHEPARD ELEVATOR CO., DIV. OF DOVER CORP.

Circle 202 for further information

FABRIC STRUCTURE WITH RIGID FRAME

MFR'S DESCRIPTION: *Portapavilion* developed combining advantages of a tent with those of rigid frame structure.

USES: shelter for summer theater, fairs, exhibitions, swimming pools, snack bars and other recreational activities.

SPECS/FEATURES: Barrie Greenbie-designed unit consists of pre-wired aluminum frame supporting tentlike covering of colored plastic fabric. Interior is unobstructed; free of any supports. Cupola reportedly permits cooling circulation of air. Design said to permit facile transportation in sections and erection without need of scaffolds.

AIA FILE NO. 35-A

MFR: PORTAPAVILION, INC.

Circle 203 for further information

PRODUCTS, EQUIPMENT, MATERIALS

ELECTRONIC ALARM FOR POOLS

MFR'S DESCRIPTION: sensitive electronic alarm developed to detect objects falling into unattended swimming pools.

USES: residential, institutional and commercial pool installations.

SPECS/FEATURES: mfr claims system can be installed in new or existing pools for less than $200. System includes sensing element submerged below water surface and remotely located alarm panel. Object falling into water causes sound vibrations detected by sensing element which relays signal to alarm panel up to 100' from pool.

AIA FILE NO. 35-F-2

MFR: HOME PRODUCTS DIV., MINNEAPOLIS-HONEYWELL REGULATOR CO.

Circle 204 for further information

ADDITIONAL PATTERNS IN TILE LINE

MFR'S DESCRIPTION: four patterns added to vinyl-cork floor tile line for 1960.

USES: varied flooring applications.

SPECS/FEATURES: all patterns have dark cork background. *Silverspun* features silver thread design; *Goldspun*, a gold thread; *Emeraldtone*, iridescent green chips; and *Desertone*, gold chips. Threads and chips have random design; are protected by clear vinyl surface, according to mfr.

AIA FILE NO. 23-G

MFR: DODGE CORK CO., INC.

Circle 205 for further information

NEOPRENE ADHESIVE FOR CURTAIN WALLS

MFR'S DESCRIPTION: adaptable, neoprene adhesive announced.

USES: as bond for curtain walls..

SPECS/FEATURES: mfr states adhesive has outstanding tensile, shear and deadload strengths; has heat resistance in excess of 325° F. Reported adaptable for any method of application.

AIA FILE NO. 24-A

MFR: ST. CLAIR RUBBER CO.

Circle 206 for further information

INTERIOR BOARD WITH ACOUSTIC QUALITY

MFR'S DESCRIPTION: *Classic Cushiontone Plank* is interior finish fiberboard said to combine acoustical efficiency, structural strength, decorative properties and insulation qualities in one material.

USES: walls and specialized ceiling applications.

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Giffels & Rossetti

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Mahon Walls can be Erected up to 60 Ft. in Height without a Horizontal Joint . . . Vertical Joints are Invisible

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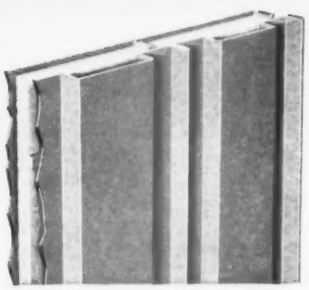
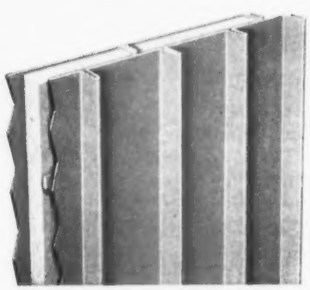
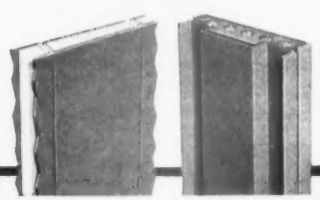
GALVANIZED or PAINTED STEEL



MAHON FLUTED WALL
FIELD CONSTRUCTED



MAHON RIBBED WALL
FIELD CONSTRUCTED



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of Steel and Aluminum

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- Long Span M-Decks (Cellular or Open Beam)
- Steel Roof Deck
- Permanent Concrete Floor Forms
- Acoustical and Troffer Forms
- Acoustical Metal Walls and Partitions
- Acoustical Metal Ceilings
- Structural Steel—Fabrication and Erection
- Steel Plate Components—Riveted or Welded

☆ *For INFORMATION See SWEET'S FILES or Write for Catalogues*

THE R. C. MAHON COMPANY • Detroit 34, Michigan
Sales-Engineering Offices in Detroit, New York, Chicago, Los Angeles and San Francisco • Sales Representatives in all other Principal Cities

MAHON

Circle 113 for further information

PRODUCTS, EQUIPMENT, MATERIALS

SPECS/FEATURES: product is manufactured in 12" wide sections, 8' or 10' in length; features sound absorbent perforations on surface. Tongue and groove joint reported to facilitate installation. Mfr states material absorbs up to 70 per cent of noise; can be nailed or stapled to wood furring strips or cemented to existing wall.
AIA FILE NO. 39-B
MFR: ARMSTRONG CORK CO.
Circle 207 for further information

FRONT ACCESS LETTER BOX ASSEMBLY

MFR'S DESCRIPTION: *Master Door*, front access letter boxes, added to line of mail handling equipment.
USES: installation in limited space areas.
SPECS/FEATURES: may be mounted on surface of wall or set flush with surface. Units are furnished assembled, ready for installation. Three sizes available; keyed and combination locking arrangements can be furnished.
AIA FILE NO. 35-H-1
MFR: CUTLER MAIL CHUTE CO.
Circle 208 for further information

HEAT RESISTANT BUILDING PANELS

MFR'S DESCRIPTION: *Thermoblok* heat-resistant color formulation for translucent fibrous glass reinforced plastic building panels announced.
USES: construction of patio roofs and awnings in warm climates.
SPECS/FEATURES: features include translucency, weather resistance, shatterproof safety and ease of installation, according to mfr. Six colors offered: snow; dusty peach; canary; tangerine; beige; and shamrock. Available in several weights in 2½" corrugations, shiplap and flat.
AIA FILE NO. 17-A
MFR: FILON PLASTICS CORP.
Circle 209 for further information

NON-STAINING SEALANT ACCEPTS PIGMENTATION

MFR'S DESCRIPTION: sealant *CS 2424* announced with ability to accept pigmentation.
USES: curtain walls, metal frames, enameled panels, marble, etc.
SPECS/FEATURES: material does not contain resinous materials known to cause color staining on surfaces. Can be pigmented to match any color specified by the architect, according to mfr. The *Thiokol*-based sealant described as unaffected by seasonal changes; will remain firm and flexible from minus 40° F to over 200°

to control any door...

russwin doorware

The Russwin 400 closer — Strongest closer ever built with full-time power control. Adjusts for speed, latching and silent closing. Also available: "delayed action" control, hold-open arm and fusible link. Mortise or surface installation. For further information write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.

Circle 114 for further information

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Rock-it
Roll-it
Press-it

THE ALL-NEW

P&S® *ROCKER-GLO SWITCH*

... the switch that *looks* right, *feels* right and *is* right for every type of wiring job.

Here is the one switch with the most wanted features on the market today.

The merest touch causes instant, silent action ... and Rocker-Glo glows in the dark.

Available in Despard and narrow rocker types.

Write for brochure, Dept. AEN-26

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SYRACUSE 9, NEW YORK

50 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill. In Canada: Renfrew Electric Co. Ltd., Toronto, Ontario

Circle 115 for further information

F; has low coefficient of thermal expansion. Application by gun or spatula possible.
AIA FILE NO. 24-A
MFR: CHEM SEAL CORP. OF AMERICA
Circle 210 for further information

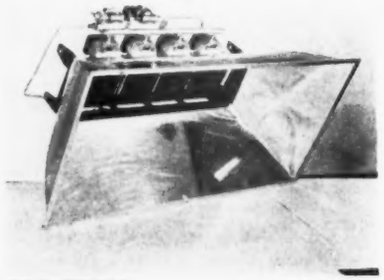
INORGANIC BOARD IS INCOMBUSTIBLE

MFR'S DESCRIPTION: *Unarcoboard* is incombustible, inorganic board for structural and insulation use in construction.
USES: walls, ceilings, partitions, fire walls, etc.
SPECS/FEATURES: mfr claims product is ideal for exposed wall surface where insulation and sound deadening properties are required. Available in sheets up to 4′ x 8′; can be sawed, drilled or planed like wood. Surface said not to require finishing. Thicknesses are 1″, 1½″, 2″, 2½″ and 3″. Density pcf ranges from 20 to 75 lbs.
AIA FILE NO. 23-L
MFR: FIBROUS PRODUCTS DIV., UNION ASBESTOS & RUBBER CO.
Circle 211 for further information

HVAC

HEATING/AC SYSTEM WITH FLEXIBLE DUCTING

MFR'S DESCRIPTION: warm air heating and central air conditioning systems offered.
USES: residential applications.
SPECS/FEATURES: units reportedly require no extensive repairs, remodeling or repainting. Feature 2″ I. D. flexible ducting which can be installed through stud spaces as is BX cable. Furnaces described as clean and quiet; require only one blower for heating and combustion.
AIA FILE NO. 30-B
MFR: JET-HEET, INC.
Circle 212 for further information



GAS FIRED INFRA-RED HEATERS

MFR'S DESCRIPTION: *Perfection-Schwank* infra-red heaters developed, ranging in output from 12,000 to 48,000 btu/hr.
USES: in difficult to heat buildings, especially high-ceilinged areas.
SPECS/FEATURES: mfr claims units are satisfactory for heating factories, warehouses and garages without ducts, blowers or heat exchangers. Infra-red rays are produced by burning gas and air mixture on surface of ceramic element. Ceramic surface glows at temperature of 1600° F and heats air through direct contact. Parabolic and straight sided reflectors included in unit. UL approved for unvented use in non-hazardous and semi-hazardous areas.
AIA FILE NO. 30-B
MFR: PERFECTION INDUSTRIES DIV., HUPP CORP.
Circle 213 for further information

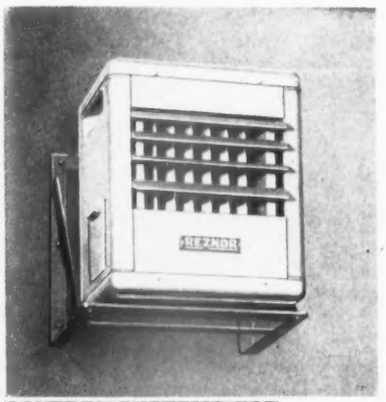
AUTOMATIC UNIT FOR AIR PURIFICATION

MFR'S DESCRIPTION: *Automatic Air Purifier* is offered as component of central air conditioning system.
USES: residential air purification.
SPECS/FEATURES: described as device for odor removal, winter dehumidification and effective air cleaning. Said to enable continuous control of quality, humidity, purity and temperature of indoor air. Mfr states filtering element need not be changed for effective operation.
AIA FILE NO. 30-D-3
MFR: CARRIER CORP.
Circle 214 for further information

COMPACT, ADAPTABLE FURNACE LINE

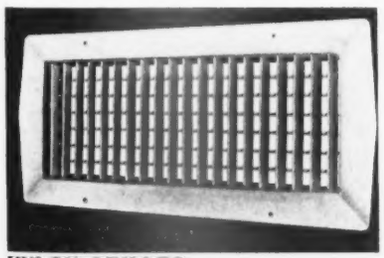
MFR'S DESCRIPTION: line of economy gas furnaces, type *144/145*, requiring as little as 2½ sq ft of floor space, now available.
USES: residential heating and air conditioning.
SPECS/FEATURES: units are compact; largest requires 4.2 sq ft of floor space. All but one model can be adapted to central summer air conditioning, according to mfr. Line available in four capacities ranging from 65,000 to 125,000 btu/hr. Heat ex-

changer of heavy gauge steel included to insure combustion efficiency and better air flow qualities, according to mfr. Blowers are large size with balanced wheels for sound reduction.
AIA FILE NO. 30-B-1
MFR: MUELLER CLIMATROL DIV., WORTHINGTON CORP.
Circle 215 for further information



CONTROL SYSTEMS FOR UNIT HEATERS

MFR'S DESCRIPTION: *Flexitemp* control system expanded to include line of suspended unit heaters in eleven capacities from 25,000 to 300,000 btu.
USES: public buildings and commercial establishments.
SPECS/FEATURES: control system reportedly eliminates hot air blasts. Units said to combine sensitive low voltage anticipating thermostat with two-speed motor and an automatic fan speed selector which operate independently of heater's burner controls, resulting in steady flow of warm air and elimination of sudden blasts and fluctuations. Controls now available with propeller fan type unit heaters and with exposed blower type and cabinet enclosed blower type heaters for quiet fan operation.
AIA FILE NO. 30-C-43
MFR: REZNOR MFG. CO.
Circle 216 for further information

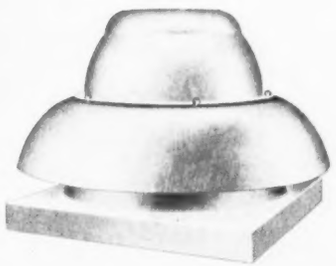


NYLON GRILLES AND REGISTERS

MFR'S DESCRIPTION: *Aristocrat 400 Series*, nylon molded grilles, registers and curved blade diffusers announced.
USES: air outlets.
SPECS/FEATURES: available in single and double reflection types with individually adjustable air-foil bars. Offered with choice of vertical or horizontal bar mountings. Registers available in multi-louver and opposed blade damper types.
AIA FILE NO. 30-J
MFR: AIR GUIDE PLASTICS CORP.
Circle 217 for further information

AUTOMATIC, OIL-FIRED BOILER

MFR'S DESCRIPTION: *Golden Oilmaster* boiler announced, available in extended or flush type casing, in gold and blue.
USES: steam or water installations.
SPECS/FEATURES: oil-fired unit said to comply with codes of Institute of Boiler and Radiator Mfrs; approved for installation on combustible floors. Equipped with oil burner; copper, built-in tankless hot water heater is optional. Glass wool insulation said to assure minimum of heat loss.
AIA FILE NO. 30-C-1
MFR: THATCHER FURNACE CO.
Circle 218 for further information



LOW CONTOUR CENTRIFUGAL VENTILATOR

MFR'S DESCRIPTION: *Centriflow* fan roof ventilators, line of low contour centrifugal units, announced.
USES: exhausting air from schools, hospitals, churches, etc.
SPECS/FEATURES: twenty-five selections of tip speeds and capacities in direct drive models and 64 belt drive models, with horse power ratings from 1/60 to 7½, provide capacities from 65 to 27,648 cfm. Models feature heavy gauge spun aluminum housings and aluminum fan wheels. V-belt drive units have adjustable sheaves to permit changing capacities.
AIA FILE NO. 30-D-1
MFR: THE BURT MFG. CO.
Circle 219 for further information

ELECTRIC DUCT HEATING SYSTEM

MFR'S DESCRIPTION: all electric duct heating system announced for use in connection with central air conditioning unit.
USES: year 'round residential use under varied climatic conditions.
SPECS/FEATURES: system consists of electric duct heating units installed directly in air distribution system. Individual room duct heaters are located immediately before outlet diffusers and controlled by separate thermostat, allowing for flexibility in meeting individual heating requirements, according to mfr. Other features include: clean, flameless heating; low voltage thermostat system; and low duct heat loss.
AIA FILE NO. 30-B
MFR: YORK DIV., BORG-WARNER CORP.
Circle 220 for further information

DUCTLESS VENTILATOR CONVERSION KIT

MFR'S DESCRIPTION: *Air-Fresh Filter-Vent* ventilator conversion kit developed for installation without ducts.
USES: kitchen ventilation.
SPECS/FEATURES: can be attached to top of hood as integral part of ventilating unit or installed above regular hood. Superior performance claimed because blowers and standard filters are combined with two additional filters.
AIA FILE NO. 30-D
MFR: STANTHONY CORP.
Circle 221 for further information

Haws
FIRST WITH BEAUTY

In drinking fountains... the skill and beauty embodied in Haws superbly styled fountains are recognized the world over: Model 10Y was selected for International Design Competition, Milano, Italy. Designed by Channing Wallace Gilson, this beautiful fiberglass fountain is only one of Haws' many distinctive fountain creations.

In flush valves... you see only a button—for Haws-Kramer "Silent Service" Flush Valve System is **concealed** in the wall to give home bathrooms the streamlined beauty of "built-in" convenience. "Silent Service" operates with **conventional pipe sizes** for easy adaptation to residential construction. Find out more!

Specify these new Haws items. See them in Sweet's Architectural File or write for complete Haws catalog—**today!**

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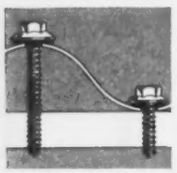
EXPORT DEPARTMENT: 19 Columbus Avenue, San Francisco 11, California, U. S. A.
Circle 116 for further information

to control interior doors...

russwin doorware

The Russwin Top-Railer Closer — Engineered to Russwin 400 Closer standards. Dual controls for closing and latching speeds . . . separate control for cushioned back-check and hold-open. One location for all doors. For further information write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.

Circle 117 for further information



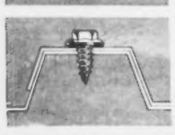
TOWNSEND gives you the complete package— the correct fastener plus field service

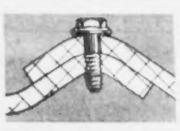
Townsend Tuff Tite fasteners are specifically designed for use with each type of construction material and method of application. This enables Townsend engineers to give you impartial assistance in selecting the right fastener for your particular job.

The wide variety of Tuff Tite fasteners gives you the advantage of leakproof construction for all types of roofing and siding.

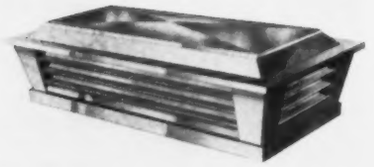
Each Tuff Tite is made with an integral head and washer plus an assembled neoprene washer, which is trapped by the undercut in the head when the fastener is tightened. The result—positive leakproof construction.

Write for Bulletin TL-149 to **Townsend Company, Engineered Fasteners Division, P.O. Box 71-V, Ellwood City, Pennsylvania. In Canada:** Parmenter & Bulloch Manufacturing Company, Limited, Gananoque, Ontario.





Circle 118 for further information



GRAVITY/POWER ROOF VENTILATORS

MFR'S DESCRIPTION: line of low silhouette, square and rectangular roof ventilators developed; *Air-X-Hausters* are of gravity type, *Powair-X-Hausters*, of power type.

USES: ventilation.

SPECS/FEATURES: sizes range from 10″ through 60″; designed for compatibility with low square and rectangular structures. Both units have certified capacities, according to mfr. Power units are UL approved.

AIA FILE NO. 12-K

MFR: G. C. BREIDERT CO.

Circle 222 for further information

POWER ROOF VENTILATOR HAS LOW SILHOUETTE

MFR'S DESCRIPTION: development of low silhouette power roof ventilator announced.

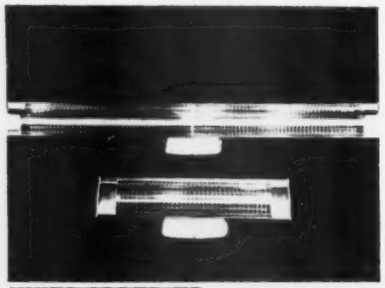
USES: roofing applications.

SPECS/FEATURES: certified by AMCA. Mfr reports: motor, belt and pillow block bearings are out of airstream; single phase motors through 1 hp have built-in auto-reset thermal overload protector; floating vibration isolators are provided for quiet operation. Sizes range from 10¾ to 48½ wheel diameter.

AIA FILE NO. 12-K

MFR: THE CARNES CORP.

Circle 223 for further information



UNITS ADDED TO RADIANT HEATING LINE

MFR'S DESCRIPTION: two heaters added to *Infra-Safe*, infra-red radiant heating line.

USES: wall and ceiling applications in industrial and domestic structures.

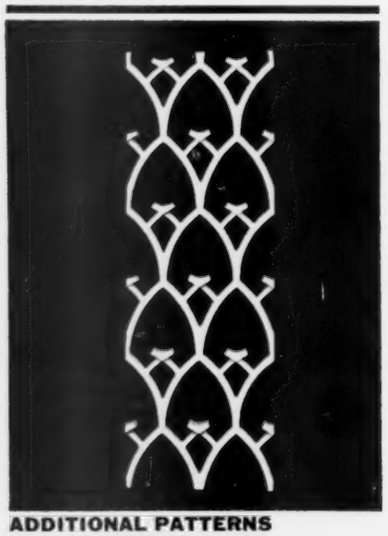
SPECS/FEATURES: models have 450 and 1500 wattage. Reportedly will not give electrical shocks because of lack of exposed electrical parts. Parts are moisture resistant. Unit is composed of quartz tube surrounding resistor coil and backed by infra-red reflector. Width and height are 4½″; length varies from 19½″ to 44½″.

AIA FILE NO. 30-C-44

MFR: HANOVIA LAMP DIV., ENGELHARD INDUSTRIES, INC.

Circle 224 for further information

METAL UNITS



ADDITIONAL PATTERNS FOR ORNAMENTAL USE

MFR'S DESCRIPTION: *Amsterdam* and *Canterbury* patterns added to ornamental castings line.

USES: screens, grilles, columns, room dividers and railing panels.

SPECS/FEATURES: patterns said to form continuous designs both horizontally and vertically by joining. Units are non-shattering, malleable iron to assure permanence and fabricating economy, according to mfr. *Canterbury* pattern illustrated.

AIA FILE NO. 15-C-1

MFR: JULIUS BLUM & CO.

Circle 225 for further information

ALUMINUM EXTRUSION FOR SOLAR SHADING

MFR'S DESCRIPTION: *Alshade*, solar shading and decorative grille, added to *Sol-Dec* line.

USES: building facings, vision screens in terraces, gardens, etc.

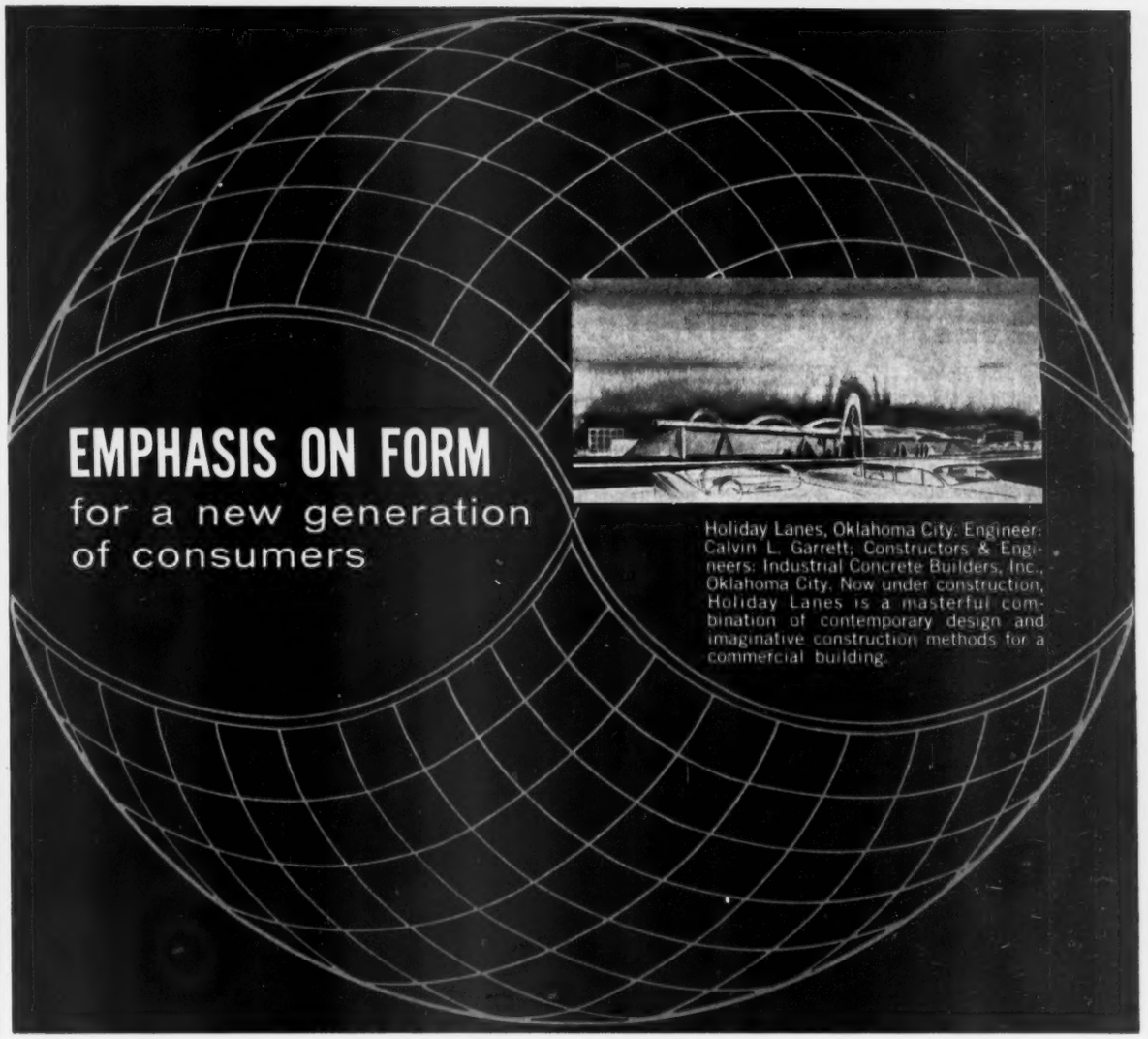
SPECS/FEATURES: available in *Shad-O-Wheel* version at present; additional patterns contemplated. Finished in choice of 11 colors. Accessory extruded frame is optional.
AIA FILE NO. 15-J
MFR: ALUMINUM CO. OF AMERICA
Circle 226 for further information

FIREPROOF SQUARE COLUMNS

MFR'S DESCRIPTION: fireproof columns, in both standard square and *Karri-More* square column, announced, featuring added reinforcement.
USES: various structural uses.
SPECS/FEATURES: lightweight concrete to insulate columns from excessive heat, is fireproofing material. It is placed between main column and thin exterior shell for trim appearance. Thickness is 1" on all sides.
AIA FILE NO. 13
MFR: SHLAGRO STEEL PRODUCTS CORP.
Circle 227 for further information

FLEXIBLE MODULAR LETTER BOXES

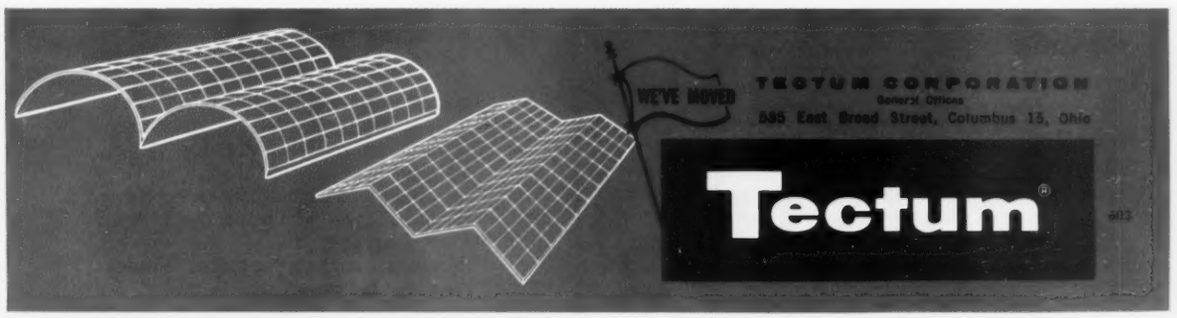
MFR'S DESCRIPTION: *Futura* is line of letter boxes in four modular sizes.


EMPHASIS ON FORM
for a new generation
of consumers
Holiday Lanes, Oklahoma City. Engineer: Calvin L. Garrett; Constructors & Engineers: Industrial Concrete Builders, Inc., Oklahoma City. Now under construction, Holiday Lanes is a masterful combination of contemporary design and imaginative construction methods for a commercial building.

Universally adaptable, infinitely variable, thin shell concrete offers unlimited scope for the designer's imagination. Forming these imaginative shapes, with Tectum form plank, furthers their utility lending warmth and texture to a variety of surfaces.

Tectum form plank, serving first as a forming material, remains in place conforming to curvatures of exciting new roof shapes. The Tectum bonds firmly to thin shell concrete as a permanent exposed surface. Tectum insulates, absorbs sound, eliminates cost of temporary materials, stripping charges and finishing. Contemporary in appearance, economical to use, Tectum form plank is gaining popular acceptance for all concrete form plank applications.

New Facts About Tectum Form Plank—an informative data sheet, just released, shows how Tectum compliments thin shell concrete construction, provides worthwhile economies in a variety of ways. Ask for Data Sheet CF150 covering the construction details of the Holiday Lanes illustrated above.



Circle 119 for further information

to hold doors open...

russwin doorware

The Russwin 1750 Holder — The ultimate in door holding efficiency. Extruded brass construction . . . virtually wear-free holding latch. Slide rides on tracks, free of dust, dirt. A smartly-designed, heavy-duty holder. For further information write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.

Circle 120 for further information

planning a school or library?

get help from these 2 STACOR equipment catalogs

They show space-saving, economical, attractive units . . . ways in which to use them . . . features that have made the Stacor name famous for well designed, well made, well accepted equipment.

WRITE, WIRE, PHONE FOR YOUR COPIES TODAY.

STACOR EQUIPMENT CO

Manufacturers of Lifetime Quality Drafting Equipment for School and Industry

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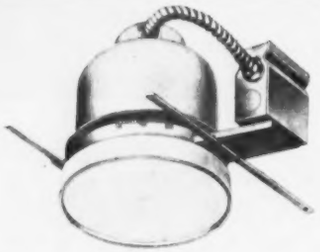
Circle 121 for further information

USES: apartment, office and institutional uses.
SPECS/FEATURES: units are made of polished satin finish aluminum. Available sizes designed to fit with each other in panel; finished width must be in 12″ units. Heights are 5½″; largest box is 11″ high. Key and combination locking arrangements possible.
AIA FILE NO. 35-H-1
MFR: CUTLER MAIL CHUTE CO.
Circle 228 for further information

INTERLOCKING DESIGN FOR METAL STRUCTURES

MFR'S DECRIPTION: metal roofing-siding panel and stud that interlocks to form strong, weather-proof structure introduced.
USES: prefabricated construction.
SPECS/FEATURES: mfr claims all metal 14′ x 20′ garage or building can be erected in single day by three unskilled men using only hammer and screwdriver. Units may be erected as either demountable or permanent structures; are available in galvanized steel, aluminized steel and aluminum. Choice of baked-on enamel finishes and building sizes available. May also be installed over existing buildings.
AIA FILE NO. 13
MFR: ALLEGHENY BUILDING UNITS,
Circle 229 for further information

LIGHTING



LIGHTING FIXTURE LINE EXPANDED

MFR'S DESCRIPTION: five units added to line of standard commercial lighting fixtures.
USES: commercial and institutional lighting.
SPECS/FEATURES: additions are: *Calculite*, recessed incandescent downlight with 96 basic housings and interchangeable diffuser-flanges; *Prismalux*, surface mounted fluorescent with one-piece lens/diffuser to provide versatile output in shallow, fully luminous light form; *Reflect-A-Line*, compact line of fluorescent light 2⅛″ deep to fit the smallest spaces; *Circulite*, surface mounted fluorescent fixture available in round or rounded square forms; and *Optiplex* and *Strialux*, modular fluorescent surface units to fill lighting requirements where recessed fixtures cannot be used.
AIA FILE NO. 31-F-22
MFR: LIGHTOLIER, INC.
Circle 230 for further information

FLUORESCENT FIXTURES WITH ACRYLIC FINISHES

MFR'S DESCRIPTION: fluorescent fixtures now available, sprayed with lucite acrylic finishes.
USES: lessen discoloration in lighting fixtures.
SPECS/FEATURES: lucite acrylic enamel by DuPont said to provide maximum reflectivity and light output; affords up to 80 per cent greater resistance to common stains. According to mfr, finish permits better paint adhesion, humidity resistance, salt spray resistance and heat resistance.
AIA FILE NO. 31-F-22
MFR: EDWIN F. GUTH CO.
Circle 231 for further information

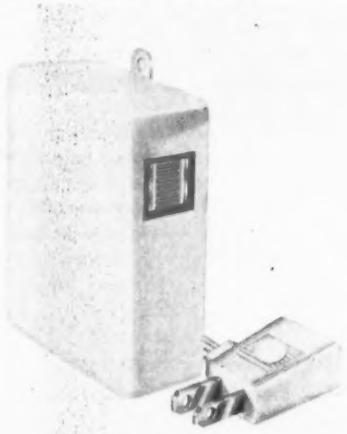
LAMP FIXTURE FOR INTERIORS

MFR'S DESCRIPTION: *Prismatic-100* announced as four lamp economy unit.
USES: varied lighting applications.
SPECS/FEATURES: 4′ unit is intended as companion to former two lamp unit. May be installed singly or in rows. Mfr recommends one unit for each 40 sq ft area, for 100 footcandle level. Steel parts are white enameled; lens is clear plastic.
AIA FILE NO. 31-F-23
MFR: WAKEFIELD CO.
Circle 232 for further information

VAPORTIGHT FLOODLIGHT FOR SEVERE CONDITIONS

MFR'S DESCRIPTION: *Bell Holder*, vaportight floodlight, announced for locations exposed to moisture, rain, sleet, ice, corrosive fumes, vapors and dusts.
USES: tunnels, bridges, loading docks, parking lots, etc.
SPECS/FEATURES: to afford protec-

tion, unit has tempered glass front lens and high temperature silicone rubber gasket. Other features include: "shield" design for elimination of back and side halo-light; pre-aiming quadrant to permit accurate focusing; and accessory fittings for pole-top, mid-pole, wall or cross-arm mounting. Units included for medium and mogul base reflector lamps up to 500 watts.
AIA FILE NO. 31-F-22
MFR: STONCO ELECTRIC PRODUCTS CO.
Circle 233 for further information



PORTABLE LIGHT CONTROL SWITCH

MFR'S DESCRIPTION: *Protect-O-Lite* is automatic, light control switch.
USES: residential, commercial, farm and industrial use.
SPECS/FEATURES: switch is activated by presence or absence of light. Designed to turn on electric power or lights at night and off at dawn. Mfr states unit requires no installation; is portable, small and compact; is simply plugged into power outlet with photo electric eye facing light. For 110-125 v ac, with 600 watt capacity. Size is 3" x 2½" x 1".
AIA FILE NO. 31-F-33
MFR: ENERGY KONTROLS, INC.
Circle 234 for further information

LUMINAIRE LINE FOR INTERIORS

MFR'S DESCRIPTION: *Achromatic, Prismalite, Wafer* and *Envoy* are introduced in line of luminaires.
USES: schools, offices, institutions and public buildings.
SPECS/FEATURES: units are designed to increase light levels, reduce glare, and promote viewing ease. Lens is one-piece shield of extruded polystyrene or acrylic shielding with uniform prismatic lens pattern to deliver maximum illumination. Available in 2, 3 and 4 lamp models in 4′ or 8′ lengths, surface or pendant mounted.
AIA FILE NO. 31-F-23
MFR: ENGINEERED LIGHTING DIV., KEYSTONE ELECTRIC MFG. CO.
Circle 235 for further information

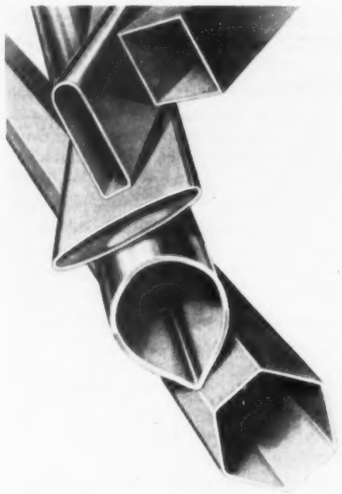
PREFABRICATED LUMINOUS CEILING

MFR'S DESCRIPTION: prefabricated luminous ceiling, featuring louvered grille work, *Modernite*, announced.
USES: interior residential installations.
SPECS/FEATURES: available in 24 sq ft sections. *Sta-Plex* louvered grille work featured, trimmed with natural or gold anodized aluminum. Mfr states product may be easily dismantled and cleaned by dipping unit in detergent bath.
AIA FILE NO. 31-F-231
MFR: STA-BRITE FLUORESCENT MFG. CO.
Circle 236 for further information

TUBING/VALVES

PLASTIC PIPE AND FITTINGS

MFR'S DESCRIPTION: four types of plastic pipe now available.
USES: utilities, sewer systems and other industrial applications.
SPECS/FEATURES: pipe reportedly offers permanently smooth bore, 10′ and 20′ lengths, high strength and light weight. Mfr claims pipe cuts evenly with handsaw; sections are easily joined with solvent weld. Resistant to breakage.
AIA FILE NO. 29-B-8
MFR: KEASBEY & MATTISON CO.
Circle 237 for further information



TUBING AVAILABLE IN VARIOUS SIZES AND SHAPES

MFR'S DESCRIPTION: square, rectangular and special shaped carbon; low alloy high strength; and stainless steel tubing is available.
USES: pressure, mechanical, heat resisting and ornamental applications.
SPECS/FEATURES: shaped tubing is formed from round tube stock; final shapes have approximately same peripheral dimensions as original round units. Dimensions range from ⅝" to 6" OD with wall thickness from .028" to .250" for carbon and alloy steel, and from ⅝" to 4¾" OD with wall thickness from .028" to .165" for stainless steel. Typical shapes include rectangles, squares, D's, stars, ovals, flat ovals, drip-lips and oval-crowns.
AIA FILE NO. 29-B
MFR: THE STANDARD TUBE CO.
Circle 238 for further information

REMOTE CONTROL VALVES FOR LABORATORIES

MFR'S DESCRIPTION: *Lab-Flo* remote control valves offered with rods of varying lengths to fit all types of laboratory equipment.
USES: open or closed type fume hoods or wherever convenience of remote control for gases or fluids is advantageous.
SPECS/FEATURES: *Model BL-4700-1*, straight type, and *Model BL-4720-1*, with 90° angle valve, have ⅜" IPS female inlets and outlets and are furnished with stainless steel floating cones and removable seats to resist corrosion. Also available with stainless steel mountings or acid-resistant coated mountings for use in fume hoods.
AIA FILE NO. 35-E
MFR: T & S BRASS AND BRONZE WORKS, INC.
Circle 239 for further information

"Sedgwick concentrates responsibility by installing Sedgwick Dumb Waiters equipped with Sedgwick Dumb Waiter Doors."
"An investment in Sedgwick Dumb Waiters minimizes yearly costs of repair and replacement."
"Specifying Sedgwick assures maximum safety and performance."
"Wide range of Sedgwick Dumb Waiters, engineered to meet various service needs, permits selection of standard equipment to meet specific duty requirements."
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FREIGHT WAITERS
SIDEWALK ELEVATORS
RESIDENCE ELEVATORS
"STAIR-TRAVELORS"
Circle 122 for further information

to assure safe exit...

russwin doorware

The Russwin Rim Exit Bolt — Heavy-duty mechanism . . . simple design. Only three moving parts. Built throughout for complete dependability. Smooth, instant, touch-and-go action. Russwin removable mullion permits full, double-door openings. For further information write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.

Circle 123 for further information

RUGGED and RIGHT!

BOMMER INDUSTRIAL HINGES and SPRING STEEL BUMPERS

#17042 Industrial Hinge
#170 Spring Steel Bumper

Ideal for industrial trucking doors—heavy duty—double acting — four springs in each hinge—individually adjustable—no sagging—door held securely by box clamps and thru-bolts—bumpers absorb shock of motorized trucks — protect doors — simple installation—variety of finishes.

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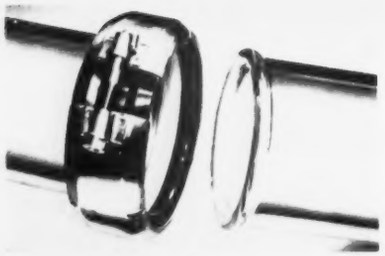
Circle 124 for further information



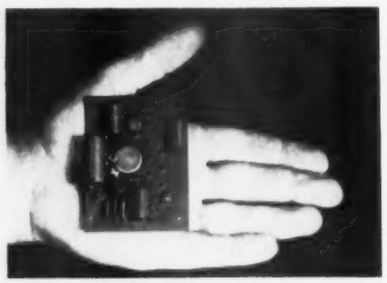
GLASS DRAINLINE AND COUPLING

MFR'S DESCRIPTION: lightweight glass drainline system with one-piece couplings for quick, permanent compression joints introduced.
USES: disposal of chemical wastes.
SPECS/FEATURES: designed to reduce installation time and cost, and eliminate failure due to corrosion or joint leakage. Can be mounted horizontally or vertically or buried in ground. Made of low expansion, borosilicate glass; 1½" diameter section weighs 0.64 lb/ft. Thirty fittings available.
AIA FILE NO. 29-B-8
MFR: CORNING GLASS WORKS
Circle 240 for further information

COMMUNICATION SYSTEMS

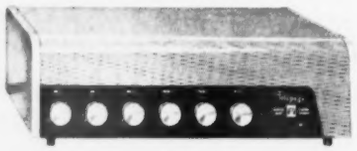
TRANSISTOR INTERCOMMUNICATION SYSTEM

MFR'S DESCRIPTION: *Chief* is all-transistor intercommunication system.
USES: offices.
SPECS/FEATURES: units are less than 3" high; are finished in chrome and gray. Features include: incoming call chime; external relay control for use in extremely high noise level areas; reciprocal power supply for use where no electrical outlet is available.
AIA FILE NO. 31-i-51
MFR: TALK-A-PHONE CO.
Circle 241 for further information



SOUND SYSTEM WITH GREATER FLEXIBILITY

MFR'S DESCRIPTION: sound system, utilizing transistorized preamplifiers, offers added advantages.
USES: public address and office applications.
SPECS/FEATURES: two advantages offered: (1) greater flexibility in location of microphones, record players, power booster amplifiers and other components; (2) distortion-free reproduction of voice messages and background music, even where input lines must be run long distances. Mfr claims economy in installation and service.
AIA FILE NO. 31-i-7
MFR: EXECUTONE, INC.
Circle 242 for further information



AMPLIFIERS FOR PAGING SYSTEMS

MFR'S DESCRIPTION: "low silhouette" paging system amplifiers now in production.
USES: uses ranging from telephone line to high volume portable sound systems.
SPECS/FEATURES: 10, 15, 25 and 50 watt units have low silhouette for space saving. Mfr states units are competitively priced. Accessories include plug-in low impedance microphone transformers, cannon microphone connectors and paging plug-in relays.
AIA FILE NO. 31-i-12
MFR: WEBSTER ELECTRIC CO.
Circle 243 for further information

INSULATION

MULTI-LAYER SECTIONAL INSULATION

MFR'S DESCRIPTION: *Zebra* is multilayer, sectional type thermal insulation material.
USES: power plant, marine and petro-chemical fields.
SPECS/FEATURES: composed of calcium silicate-asbestos fiber bonded felts. Designed for temperatures ranging from 200° F to 1200° F, according to mfr. Available in nominal thicknesses of 1" to 4" for pipe sizes ½" to 6" in diameter; 1½" to 4" for pipe 7" to 24" in diameter, in sectional or tubular form.
AIA FILE NO. 37-D-2
MFR: KEASBEY & MATTISON CO.
Circle 244 for further information

ROOF SLAB AS INSULATION AID

MFR'S DESCRIPTION: *Fissured* surface and *Linen White* finish now available on multi-purpose insulating roof slab.
USES: exposed-beam construction.
SPECS/FEATURES: product features textured surface with white finish which will absorb up to 75 per cent of sound striking the ceiling, accord-

ing to mfr. Structural roof deck, thermal insulation, sound-quieting and finished ceiling reportedly combined in one product. Units meet FHA requirements for direct nailing of asphalt shingles on 2″ minimum slopes.

AIA FILE NO. 37-B

MFR: THE CELOTEX CORP.

Circle 245 for further information

SPRAYED RIGID URETHANE FOAMS

MFR'S DESCRIPTION: techniques and equipment announced for spraying rigid, polyether-based urethane foam developed by Wyandotte Chemicals Corp.

USES: insulation, corrosion control, etc.

SPECS/FEATURES: foam described as self-adhering; can be sprayed on vertical surface without sag or runs. Suggested applications include exterior coating of tanks, covering of pipes and pipelines and other industrial installations. Up to 7″ of foam can be applied to vertical surface without sag or drip, according to mfr. Flow is at rate of 3-5 lbs per minute with 10-20 board feet of coverage per minute. Density is 2.5 to 3.5 lbs pcf. After setting, surface may be finished with paint, etc.

AIA FILE NO. 37-D

MFR: THE DEVILBISS CO.

Circle 246 for further information

INDUSTRIAL BLOCK AND PIPE INSULATION

MFR'S DESCRIPTION: *Careytemp* versatile block and pipe insulation announced, for temperatures up to 1600° F.

USES: insulating chemical processes.

SPECS/FEATURES: material is composed of expanded silica with specially developed binder; reinforced with inorganic fiber, according to mfr. Features include: water resistance; lightweight without loss of strength; ease in cutting; and economy in time and cost.

AIA FILE NO. 37-D-2

MFR: THE PHILIP CAREY MFG. CO.

Circle 247 for further information

DOORS/WINDOWS

RESIDENTIAL WOOD WINDOW LINE

MFR'S DESCRIPTION: *Vistarama* line of panel, picture-awning and unitized casement windows announced, to compete in quality wood window market.

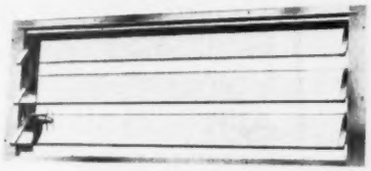
USES: residential and other fenestration applications.

SPECS/FEATURES: can be used for single or grouping installations, and as awning, hopper or economy casement ventilating units, or with fixed sash, according to mfr. Features include: flexible neoprene weatherstripping applied to frame; glass set in glazing compound and secured by wood stops; cadmium-plated nylon shoe hinges with adjustable tension on panel and picture-awning units; and removable framed grids in three styles for casement windows.

AIA FILE NO. 19-E-1

MFR: THE WABASH SCREEN DOOR CO.

Circle 248 for further information



NON-CORROSIVE JALOUSIE UNITS

MFR'S DESCRIPTION: *Ualco* aluminum jalousie basement windows offered at price of ordinary basement windows.

USES: residential installation.

SPECS/FEATURES: units are constructed of non-corroding aluminum with soft finish; have all features of regular jalousie window, according to mfr. Furnished with choice of clear, obscure or colored glass or aluminum louvers. Operator designed to secure louvers in any position. Mfr claims units require no painting or replacement.

AIA FILE NO. 16-L

MFR: SOUTHERN SASH SALES & SUPPLY CO., INC.

Circle 249 for further information

MISCELLANY

SCALE/DISCOLORATION REMOVAL

MFR'S DESCRIPTION: *Ox-Off #536* offered to remove oxide, scale and heat discoloration from aluminum in one operation.

USES: preparation for welding aluminum; improve appearance.

SPECS/FEATURES: for oxide removal, metal is wiped or dipped in prepared solution at room temperature and rinsed. Mfr states product has application in removing discolorations from aluminum and also leveling minor scratches and mars.

AIA FILE NO. 15-M

MFR: CHEMCLEAN PRODUCTS CORP.

Circle 250 for further information

CABINET UNITS RAISED FROM FLOOR

MFR'S DESCRIPTION: "off-the-floor" cabinets added to cabinet line.

USES: residential kitchen installations.

SPECS/FEATURES: units are designed to permit combinations with types which rest on floor. Durable construction claimed. Over 1,000 types available with ten enamel and ten natural finishes. Features include:

FREE LIGHT cascades from 22,000 square feet of corrugated roof panels at Port of New York Authority Pier 1, Furman and Fulton Streets, Brooklyn. Panel fabricator: Barclite Corp. of America.

They wanted plastic glazing without fire hazard

This isn't ordinary plastic glazing.

It's made with Hetron,® the polyester plastic that can't spread a blaze.

Regular plastic panels are fine for daylighting where there's no code problem—and where fire isn't a potential hazard. But when either of these conditions exists, you need a panel you *know* is safe—because it passes industry-accepted tests.

That's what Hetron-based panels do. All the leading fabricators can supply you with them. You don't have to guess about them. They have the U/L label or Factory Mutual seal of approval right on them. They're designed to meet the stiffest codes.

These safer panels cost a little more. They're worth it because they give you —without fire hazard—big areas of soft natural light where you want it. No glare. Savings on electric light. No shades, blinds, or painting. *No breakage.* Quick, simple installation. Excellent weather resistance.

So specify with confidence. Write "Hetron-based" on the spec sheet. Then you know you're in the clear. If you'd like names of fabricators who can supply you, drop us a line.

DUREZ PLASTICS DIVISION

9202 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICAL CORPORATION

HOOKER CHEMICALS PLASTICS

Circle 125 for further information

The pictorial of fine timber construction in PUBLIC, COMMERCIAL and INDUSTRIAL BUILDINGS using

TECO WEDGE-FIT CONNECTORS

The most efficient mechanical fastenings for wood yet developed — and the most economical.

THIS 24-PAGE BOOKLET illustrates the flexibility and economy of timber roof construction in STORES AND MARKETS having spans from 50′ to 120′, and also shows its uses in FACTORIES, WAREHOUSES, Recreational Buildings, Garages, Hangars, Motels, Bridges, Towers, and other modern structures of wood, using Teco connectors.

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AEN-601

Circle 126 for further information

PRODUCTS, EQUIPMENT, MATERIALS

beverage trays; revolving shelves; linen and silver trays; and doors with nylon bearings and magnetic catches.

AIA FILE NO. 35-C-12

MFR: WHITEHALL KITCHENS

Circle 251 for further information

ELECTRONIC WELDING UNITS

MFR'S DESCRIPTION: two automatic units offered for use with *Heliweld* (tungsten-inert-gas) welding process.

USES: welding applications.

SPECS/FEATURES: *Models HMH-D and HMH-E* are electronically controlled units for use with either AC or DC welding, without accessory control, using argon, helium or mixtures of these. Designed for long run applications on ferrous and nonferrous metals. Mfr states principal advantages are sensitivity and response to changes in arc length, touch or high frequency starts, 360° rotation in any position with 2″ adjustment of machine holder across weld bead and vertical travel of 14½″.

AIA FILE NO. 31-M

MRF: AIR REDUCTION SALES CO., DIV., AIR REDUCTION CO., INC.

Circle 252 for further information

BRASS/ALUMINUM DOOR PULLS

MFR'S DESCRIPTION: two pulls added to hardware line.

USES: applications on doors and drawers.

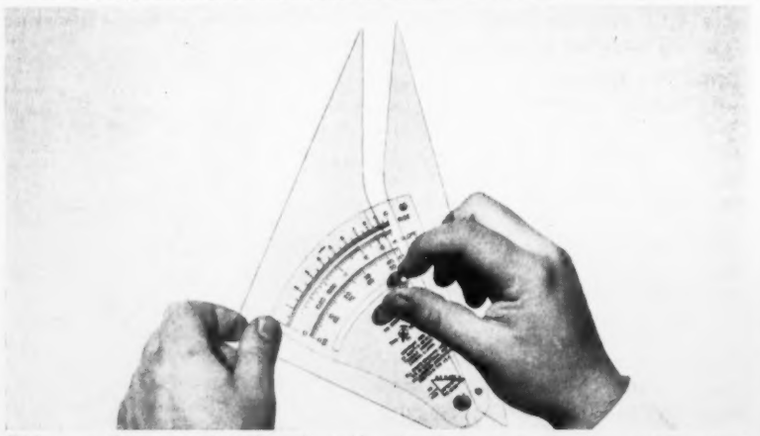
SPECS/FEATURES: available in three sizes, machined from solid brass and solid aluminum. Brass model is lacquered; aluminum is anodized and is available in colors.

AIA FILE NO. 27-B

MFR: THE ENGINEERED PRODUCTS CO.

Circle 253 for further information

DRAFTING TRENDS



This versatile, easy-to-handle, adjustable triangle is made of yellow-tinted optical-grade acrylic plastic. A clean-cut oval track fitted with metal knurled knob assures ease of operation and lasting tight fit.

New combination protractor-triangle speeds up drafting

Architects, Engineers, Builders, Field Surveyors, Mathematicians—anyone who develops solutions to measurement problems indirectly to determine a wanted measurement graphically or mathematically—will find the Trig-Matk Adjustable Triangle a handy tool. It eliminates much of the graphic work necessary in estimating results or in checking for correct answers.

Versatility with accuracy

Basically the new Post Trig-Matk Adjustable Triangle is a mathematician's tool—accurate to three decimal places.

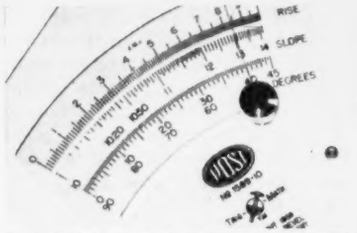
It combines the functions of a protractor and a triangle into a simple unit, with two fundamental trigonometric relationships of a right triangle. The Trig-Matk provides accuracy within 0.1% in problems dealing with any of the six trigonometric ratios of the sides of a right triangle.

The adjustable protractor has three sets of graduations. One set is graduated in half degrees, labeled *Degrees*, and permits the use of the Trig-Matk as a protractor setting for determining any angle from 0 to 90 degrees.

The second set of graduations, labeled *Slope*, shows directly the *Secant* trigonometric ratio of the angle indicated on the degree scale. The third scale, labeled *Rise*, indicates directly the *Tangent* trigonometric ratio shown on the degree scale.

Examples

This new tool has a host of drafting and engineering applications. Highway designers find the Trig-Matk very useful when making cross sections of roadways at ground level or below. By setting the *Slope* scale to the degree desired, road-curve grades are automatically determined. The protractor can be used to determine the angle of highway ingress and egress lanes.



An indicated angle of 40 degrees on the Trig-Matk (1589) shows directly that the Rise is 8.4 to the base of 10.

Structural Engineers will find the Trig-Matk Adjustable Triangle a simple tool, eliminating the use of both a scale and individual triangles. In addition to the time saved, many of the errors usually associated with the older method are avoided. The Trig-Matk design eliminates the need of frequent reference to handbooks for information on various bevels.

Two Bases

The Trig-Matk No. 1589-12 has a 12″ base scale for handy calculation in terms of feet and inches. Number 1589-10 has a metric base scale of 10.

Keep posted on all the latest trends in drafting. Consult your local Post dealer, or write to Frederick Post Co., 3654 North Avondale Ave., Chicago 18, Ill.

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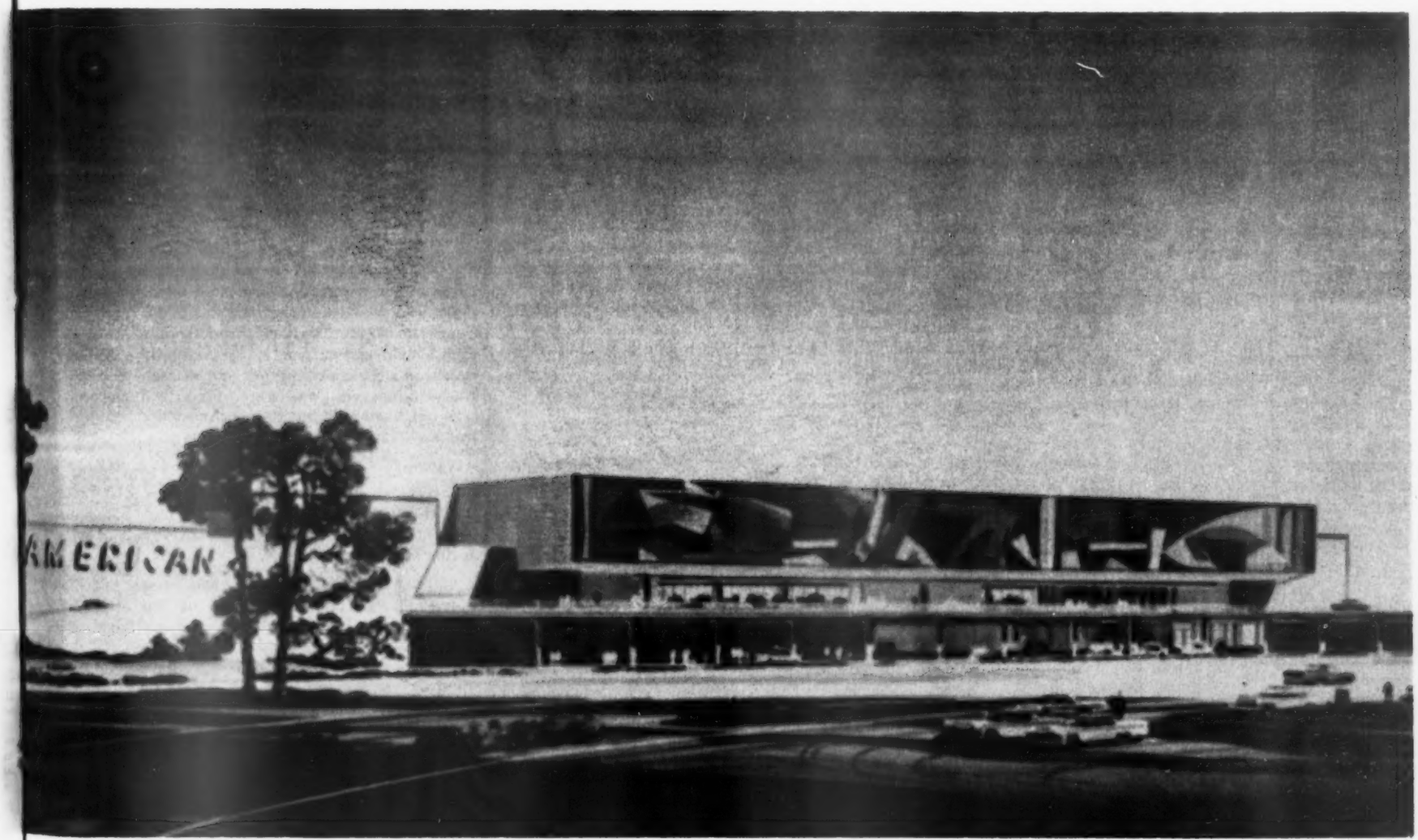
ENGINEERING EQUIPMENT & DRAFTING SUPPLIES • FIELD EQUIPMENT & DRAFTING FURNITURE

Circle 127 for further information

Passenger Terminal, New York International Airport	*project*
American Airlines, Inc.	*client*
Kahn and Jacobs, Architects, Roy S. Bent, Associate	*architects*
Severud-Elstad-Krueger-Associates	*structural engineers*
Jaros, Baum and Bolles	*mechanical engineers*
James P. O'Donnell	*fueling engineer*
Paschall Campbell	*landscape architect*



Program description

The new American Airlines Terminal at Idlewild represents the second major step in America's program of facilities construction for the jet age in New York. (The first was a $12 million hangar which was designed by the same architects.)

Idlewild Airport is designed as a system of unit terminals, since most of its traffic consists of originating and departing flights. These buildings represent one of the few opportunities for complete functional and aesthetic expression of each of the airline's purposes. American Airlines' terminal is conceived as a symbol of the jet age.

The terminal is being built in two phases. It will open with

(Continued on page 36)

eight "gates" for the accommodation of eight jet aircraft and may be expanded to 16 gates. It will ultimately handle 4 million passengers and visitors per year at the rate of over 4,000 per peak hour. It is designed to accommodate not only the public, but the majority of the airline's offices at Idlewild.

Plan elements

The three-story main building acts as a link between the two-story driveway and the two-story departure concourses. It contains the lobbies, waiting areas, baggage claim counter and Admirals Club. Its wings house regional flight dispatch, outbound baggage facilities, plane meal kitchen and refreshment areas.

The two departure concourses contain four departure lounges each, one at each aircraft gate and also house the aircraft service areas.

The building covers 2¼ acres. The rest of the 29 acre site is occupied by 13½ acres of concrete paving for aircraft plus roads and landscaped areas.

The enplaning passenger arrives by car on the upper driveway and enters the main or second level of the terminal. He checks in and goes directly to the departure lounge and waits for his aircraft. The deplaning passenger disembarks, walks to the main building and descends to the lower level where he claims his baggage and finds his ground transportation on the lower driveway. All services and operations are confined to the lower level and are entirely separated from passengers.

General features

The most conspicuous feature of the terminal is its curved stained glass mural 317 feet wide and 22 feet high, designed by Robert Sowers. The mural is executed in both antique and modern opal glass and is visible from the interior and the exterior by day or night.

The building also contains two 1,000 square foot murals by Hector Bernabo, known as Carybe, and 3,000 square feet of ceramic murals designed by Sam Weiner. These murals combine with brilliant colored tile walls to draw the passenger through the building complex.

The exterior masonry and metal walls and special double glazed window construction, as well as roof and other exterior elements, were designed for the exclusion of aircraft noises.

Enclosed movable telescoping bridges are provided to carry the passenger from the main level of the terminal unit to aircraft without going outdoors. Four air curtains allow doorless access to the main lobby and 44 pneumatic passenger doors facilitate ingress and egress.

Structural notes

The concrete slabs of the main building rest on concrete fireproof steel. Steel roof deck and its supporting beams are spray fireproofed.

In the concourse, pre-cast insulating plank floors and steel decks are supported by exposed structural steel.

The building contains 1,900 tons of steel and 12,000 cubic yards of concrete. It is supported by 46,000 lineal feet of piles; concrete filled steel piles are used in the main building and wood piles in the concourses.

Mechanical notes

By means of chilled water and high temperature hot water lines, 950 tons of refrigeration and 35 million BTU per hour of heating will be furnished from the airport's boiler plant. Chilled water and intermediate temperature hot water are distributed to four fan rooms, each of which contains several heating and air-conditioning systems serving a still greater number of control zones. The systems are pneumatically controlled and intermediate temperature water is used in convectors to supplement the air distribution.

Snow-melting by means of mineral oil is provided for the driveway ramps. Charcoal filtration for fresh air is built into concourses and is optional in the main building.

High and low pressure water are distributed and the passengers' egress from the aircraft is protected by means of a fixed sprinkler system which cools the exterior of the front loading bridges in case of aircraft fires. The building is traversed by a 3 inch semi-automatic pneumatic tube system and variable speed baggage conveyors and message conveyors. Two kinds of fuel will be delivered directly to the aircraft by means of buried piping to be connected to the airport's central tank farm.

Electrical system

The highly diversified electrical system includes 110 volt and 220 volt lighting, a variety of power services, and 440 volt, 400 cycle current for aircraft provided by 200 HP motor-generator sets at each gate.

Fluorescent light fixtures circling the concourses at the main level provide uniform illumination of the aircraft pavement; all lighting is confined below the eye level of passengers and pilots.

Paving

At the present, 13½ acres are paved with 4,000 psi concrete. The entire site was first compressed by a 6 foot deep surcharge of 250,000 cubic yards of sand to produce compaction of 4 inches in the subgrade.

Volume and cost

Gross floor area	200,000 sq. ft.
Gross volume	3,200,000 cu. ft.
General construction and indirect costs	$6,213,000
Paving and surcharge	2,106,000
HVAC	1,169,000
Plumbing and sprinklers	465,000
Electrical	1,269,000
Total	$11,222,000

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AIA FILE No. 29-D-42

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a i

MEANS REFRESHMENT

Superbly engineered, the smart new Oasis On-A-Wall Water Cooler is designed for modern architecture.

Elegantly styled, the On-A-Wall has a crisp modern look. It is the first water cooler to have a vinyl laminated steel cabinet. The rich silver spice color in Scandia pattern adds vitality to any decor. This mar-resistant surface material has unequalled durability . . . ideal for busy traffic locations. Recessed anodized aluminum grille has an ultra-modern basketweave pattern for sleek appearance.

With the highest back-splash of any wall-hung cooler, the On-A-Wall has a stainless steel top and deep basin with anti-splash ridge. Famous Dial-A-Drink bubbler, built like a fine watch, is far from wall to provide ease in drinking. In every detail, the new On-A-Wall has the famed Oasis engineering that has the finest record of trouble-free performance in the industry.

It's easily mounted, too. Yes, the On-A-Wall is off the floor, easy to clean around. It's flush with the wall to save space and conceal plumbing. Time-saving mountings for ease of installation are available.

Just tear out this page along the perforation, and you have a complete specification sheet for the wonderful new Oasis On-A-Wall Water Cooler.

For prices and complete details on America's most complete and finest line of water coolers, write for handsome 4-color Architect Album assembled especially for architects and engineers.

THE EBCO MANUFACTURING COMPANY
Columbus 13, Ohio

OASIS
EBCO GOLDEN ANNIVERSARY 50 years of Progress

OASIS MODEL OW-7 & OW-13

(IDENTICAL UNLESS OTHERWISE NOTED)

COLD WATER: Model OW-7: 7 gallons per hour serves up to 85 people in schools and offices, 50 in light industry. **Model OW-13:** 13 gallons per hour to serve up to 155 people in offices and schools, 90 in light industry.

DIAL-A-DRINK BUBBLER: Delivers a level drink at pressures above 20 lbs.

SPLASHPROOF TOP: 18-8 stainless steel top with anti-splash ridge, has easy-to-clean integral strainer grid. Hand polished to a mirror finish. Cleans in seconds. High, anti-splash back is 3½" above bottom of basin. Plumbing provided for Glass filler.

COST-CUTTING PRE-COOLER: (Model OW-13 only) Nearly doubles capacity without extra operating cost by cooling incoming water with cold waste water. Double-wall construction meets codes.

TANK AND COOLING COIL: Burstproof, vented red brass tank with copper refrigerant coil, metal bonded to exterior. Hot tin-dipped after assembly. Two metal walls between drinking water and refrigerant. Meets plumbing codes. Inside of tubing and connections cold-tinned to prevent corrosion. Refrigerant heat exchanger. Tank type storage system, 5 quart capacity, reduces starts and operating time. Tank drain provided.

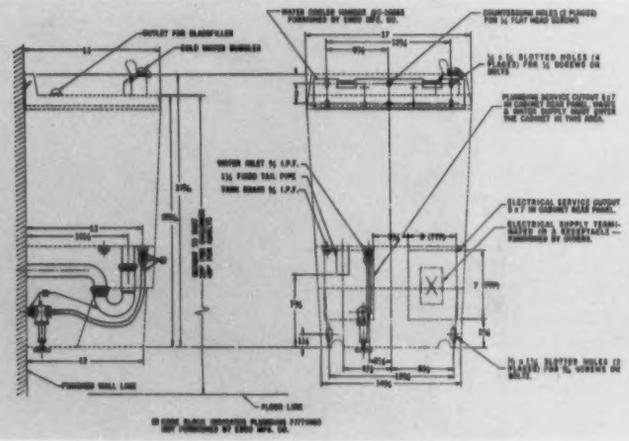
COLD CONTROL: Freon-12 refrigerant controlled by accurately calibrated capillary tube. Adjustable thermostat switch behind removable front panel controls cold water temperature.

REFRIGERATION UNIT: Forced air-cooled. ¼ h.p. internally sprung, hermetically sealed compressor has automatic overload protector. No lubrication needed. 115 volt A.C., 60 cycle only.

INSULATION: Granulated cork completely insulates cooling system. Layer of hydrolene gives complete vapor seal.

HANDSOME CABINET: 20 gauge steel with Vinyl Laminate exterior finish of Silver Spice color. Interior surfaces protected with corrosion resistant paint coating. Well ventilated. Easily removable front panel and anodized aluminum grille — no tools required. Standard Wall Hanger and template provided. **Also available with stainless steel cabinet panels at extra cost.**

MOUNTING: The standard hanger supplied with the water cooler will satisfy most requirements. Additional mountings designed specifically for masonry, and wood stud, construction are available at slight additional cost. If codes require, carriers are also available. Write for additional information and installation instructions.



SPECIFICATIONS SUBJECT TO CHANGE

Meets U. S. Bureau Of Standards Specifications . . . meets Public Health And Sanitary Plumbing Codes.

THE EBCO MANUFACTURING CO. **COLUMBUS 13, OHIO**

From almost any angle, this beautiful new Oasis Cooler fits most requirements to a cat's whisker. Completely new in concept . . . from creative design and functional styling to quality features and cost-cutting advantages. It's up off the floor . . . saves space . . . conceals all plumbing . . . and delivers refreshingly cool water at the touch of Oasis' famed Dial-a-Drink Bubbler. Yes, tigers . . . and you . . . have never had it so good!

WEIGHT: Shipping weight about 125 lbs.

ACCESSORIES: Glass filler, special mounting brackets, hangers and carriers.

CAPACITY TABLE (GALLONS PER HOUR)

	ROOM TEMP.	OW-7	OW-13
Inlet water 70° F	70° F	12.5	19.6
	80° F	11.1	18.3
	90° F	9.7	17.1
	100° F	8.4	15.8
Inlet water 80° F	70° F	8.8	15.5
	80° F	8.0	14.2
	90° F	7.1	13.0
	100° F	6.2	11.8
Inlet water 90° F	70° F	7.0	12.5
	80° F	6.3	11.4
	90° F	5.6	10.3
	100° F	5.0	9.3
Inlet water 100° F	70° F	5.8	10.7
	80° F	5.1	9.7
	90° F	4.7	8.8
	100° F	4.3	8.0

Cup service OW-7 same as shown
Cup service OW-13 same as OW-7

FULL 5-YEAR WARRANTY: Covers entire refrigeration system PLUS all components such as bubbler valve, fan motor, relay, overload and temperature controls for material and workmanship.

EXPORT

POWER SUPPLY: Transformers are available for power supplies other than 115 V-60 cycle single phase.

WARRANTY: Full 1-year warranty on entire cooler. 4-year replacement contract on sealed refrigeration system.

LITERATURE

Literature cited in this department is available from various manufacturers and associations free of charge. To obtain copies, circle the keyed numbers on the reader service cards facing pages 1 and 50.

MICROFILM INDEXING

Basic Microfilm Indexing and Filing Techniques, is offered as a guide for those wishing to achieve maximum results from a microfilm system. May have applications in drafting rooms. Aids offered include three ways of photographing records, methods of filing and indexing, visual and mechanical indexing and cards and jackets for "unitizing" microfilm.

AIA FILE NO. 35-H-3

MFR: CHARLES BRUNING CO., INC.

Circle 300

THERMOPLASTICS BOOKLET

Recommended procedures for machining and finishing of thermoplastic sheets, rods and tubes are presented in recent booklet. Procedures include sawing, routing, drilling, turning, shearing, punching, grinding and finishing. Also general recommendations for tool design, feed and speed, and use of coolants are presented. Special machining characteristics of acrylics, nylon, fluorocarbons and polyethylene are covered. (8 pp.)

AIA FILE NO. 24

MFR: CADILLAC PLASTIC & CHEMICAL CO.

Circle 301

GLASS CATALOG

Recent catalog presents line of glass for industrial, commercial, school and residential use. Photographs, recommended installations and dimensions are presented for figured glass, wire glass, heat absorbing glass, and glare reducing finishes. Light diffusion, light distribution, decorative glass and structural corrugated glass are discussed. (20 pp.)

AIA FILE NOS. 26-A-3; 26-A-5; 26-A-6

MFR: MISSISSIPPI GLASS CO.

Circle 302

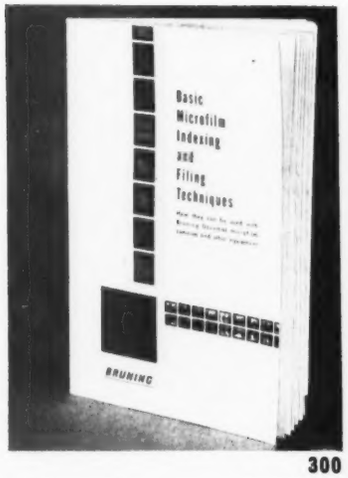
FLEXIBLE PIPE

Current data sheet is available, describing *Vibraflex,* flexible, rubber pipe. Material is designed as noise and vibration eliminator for industrial, commercial and residential buildings. Application data is given, in addition to a chart providing sizes and lengths available in both type *150* for working pressure up to 150 lbs, and type *250* for pressures not exceeding 250 lbs. Applications as corrosion resistant replacement for cast iron or steel pipe also claimed. (2 pp.)

AIA FILE NO. 29-B-8

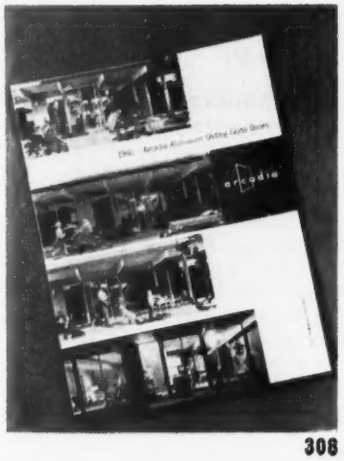
MFR: MERCER RUBBER CO.

Circle 303



300

304



308

THERMAL INSULATION

Comprehensive, indexed catalog describes thermal insulations for all types of commercial and industrial requirements, in applications ranging from minus 400° F to 3000° F. Six sections are devoted to specialized groups of insulations, including industrial and high temperature; plumbing, heating and air conditioning; refrigeration; insulating firebrick and refractories; finishes and weatherproofing materials; and miscellaneous insulations including asbestos papers, millboard, felts, blankets and others. Information presented for all types includes: application photographs; available forms or types; advantages; detailed specifications; temperature limits; and compliance with ASTM standards. (54 pp.)

AIA FILE NO. 37-D

MFR: JOHNS-MANVILLE

Circle 304

ALUMINUM RIVETING

Technical booklet, *Riveting Aluminum,* now available, describing various aspects of riveting aluminum parts. Information included on conventional and special rivets and design and function of riveted joints. Tabular data provides weights and dimensions of aluminum rivets, recommended rivet lengths and mechanical properties of wrought aluminum alloys. (52 pp.)

AIA FILE NO. 13-C-1

MFR: REYNOLDS METALS CO.

Circle 305

WELDING ELECTRODES

Electrode Pocket Guide, recently issued, contains information on such types of electrodes as mild steel, low alloy, low hydrogen, iron powder, stainless steel, hardfacing, non ferrous and cast iron. Brief descriptions, applications, procedures and pertinent AWS and ASTM data are presented for each type. Tabular data is included on comparison of electrodes, government specifications and recent data on types. (64 pp.)

AIA FILE NO. 31-M

MFR: AIR REDUCTION SALES CO. DIV., AIR REDUCTION CO., INC.

Circle 306

TRANSFORMER BULLETIN

Features, installation, application of pad-mounted transformers (distribution units rated 25 to 100 KVA) and semi-buried transformer enclosures for pole type distribution transformers up to 167 KVA are covered in current bulletin. Dimensional drawings, photographs, rating tables and circuit diagram for typical underground residential system are included. (12 pp.)

AIA FILE NO. 31-B-3

MFR: GENERAL ELECTRIC CO.

Circle 307

DOORS/HARDWARE

SLIDING DOORS

Aluminum sliding doors, said to have increased weathertightness, are described and illustrated in 1960 catalog. Included are details and specifications for three lines of doors; selection chart which summarizes features and general data; and listing of accessory items, including muntins, transoms, jamb joining kits and construction information. Increased weathertightness said to have been achieved in part, through placement of sliding panel on exterior of installation rather than interior. (12 pp.)

AIA FILE NO. 16-E

MFR: ARCADIA METAL PRODUCTS

Circle 308

DOOR CATALOG

Illustrated catalog presenting 1960 line of rolling doors and partitions is announced, with expanded sections treating counter doors and side-coiling partitions. Architectural specifications, detail drawings, dimensions, general information and UL

Circle 107 for further information about Ebco →

requirements are provided for line which includes steel and aluminum rolling service doors, UL rated, *Servire* fire doors and steel and aluminum rolling grilles. Charts also included to simplify selection of proper gauge and type of slats, guide type, power units and other components. (20 pp.)
AIA FILE NO. 16-D
MFR: THE COOKSON CO.
Circle 309

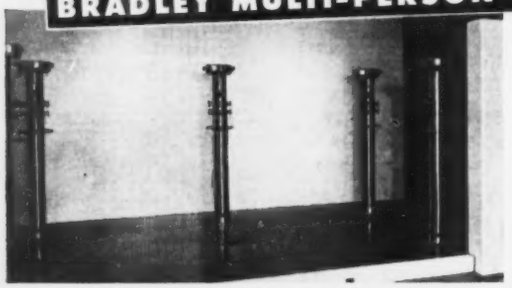
DOOR HARDWARE

Revised catalog for 1960 pictures and describes line of door opening, "push-pull" units. Dimensions are provided for units which are available in aluminum, brass, bronze and stainless steel. Other units included which incorporates wood sections. Detail drawings and special designs are presented. (16 pp.)
AIA FILE NO. 27-B
MFR: CIPCO CORP.
Circle 310

STEEL DOORS

Rolling steel doors for industrial and commercial requirements are featured in current catalog. Discussed are features and engineering specifications of standard hand, mechanically and power operated doors, both UL-labeled and non-labeled types, window shutters and grilles. In addition, specifications, installation, operating devices, weathering, windlocks, transparent windows and automatic fire doors are covered. (16 pp.)
AIA FILE NO. 16-D
MFR: BUILDING PRODUCTS DIV., R. C. MAHON CO.
Circle 311

BRADLEY MULTI-PERSON SHOWERS



Above installations of 4 Bradley Column Showers—20 bathe simultaneously

Nothing Like a Shower After Exercise or Work

Today facilities for shower baths cost less, require less installation time and less maintenance.

EACH BRADLEY COLUMN PROVIDES FOR 5 SHOWERS

Thousands are bathing daily, in colleges, schools, parks, factories, institutions, at low cost—because each Bradley Shower Column provides 5 Showers yet requires only *one* set of piping connections. The result—80 per cent installation cost decrease.

After work or exercise nothing is as refreshing as a shower . . . and Bradley Columns may be equipped with stall-separating partitions and curtains if greater privacy is desired. A built-in liquid soap dispenser is also offered.

Write today for new Group Shower Bulletin H-1322 to BRADLEY WASHFOUNTAIN CO., 2357 West Michigan Street, Milwaukee 1, Wis.

Write for Bulletin H-1322

Large base casting serves as both drain and anchor.

Bradley

BRADLEY multi-person showers

Circle 129 for further information

HVAC

ELECTRIC HEATING

Topical catalog stresses versatility, economy and convenience of 40 different units in air heating equipment for residential and commercial installations. Typical arrangements, photographs and specifications are presented for wall radiant heaters, wall convectors, forced air heaters, perimeter panels, baseboard panels, bathroom heaters and portable heaters. Data on heating cables, controls and thermostats also included. (16 pp.)
AIA FILE NO. 30-B
MFR: WESIX ELECTRIC HEATER CO.
Circle 312

AIR VALVE BULLETIN

Bulletin K-46 describes *Pneumavalve*, high velocity air valve reported to function without air motors or mechanical linkage of any kind. Construction and performance features, characteristics and dimensions are provided for single duct and dual duct models. (2 pp.)
AIA FILE NO. 30-D
MFR: CONNOR ENGINEERING CORP.
Circle 313

IRON BOILER CATALOG

Revised catalog features *Series 150*, industrial cast iron boilers, including 33 sizes with ratings from 600,000 to 5,400,000 btu input for hot water and steam heating systems. Changes in ratings and controls, illustrations, dimensional drawings and specifications are contained. (8 pp.)
AIA FILE NO. 30-C-1
MFR: PEERLESS HEATER CO.
Circle 314

RESIDENTIAL HEATING

Design for Modern Electric Heating is current pamphlet describing procedures of electric heating for residences, considering factors of health, safety, comfort, durability, beauty and convenience. Detailed analysis of costs is presented, plus descriptions of individual heating units and a typical installation. Location of units, insulation required, controls and remodeling applications are also included. (32 pp.)
AIA FILE NO. 31-K
MFR: WESIX ELECTRIC HEATER CO.
Circle 315

LITERATURE

AC UNITS

Recent catalog describing 1960 line of air conditioning units, is offered to architectural and engineering firms. Included are: high pressure air handling units ranging from 0" to 8" total static pressure; *SCD* air handling line for humidity control; *Perma-Fan* evaporative condensers; room air conditioners for remote or ceiling suspension; *Flexazone* air conditioners for year 'round temperature control; and air cooled condensers. (221 pp.)
AIA FILE NO. 30-F
MFR: DRAYER-HANSON DIV., NATIONAL-U. S. RADIATOR CORP.
Circle 316

SEALANTS/COATINGS

PAINT EXPOSURE TESTS

Current book gives detailed information on results of study of applications and exposure tests of exterior paints made with *Rhoplex AC-33*, 100 per cent acrylic resin emulsion. Book contains 17 tables of formulations, applications and test results; may interest architects and specification writers. Test program, six years in duration, covers both commercial paint jobs and data on test panels. Materials on which study was made include wood surfaces, asbestos-cement shingles, stucco, concrete blocks and cement. (54 pp.)
AIA FILE NO. 25-B-25
MFR: ROHM & HAAS CO.
Circle 317

STRUCTURAL SEALANTS

Current bulletin presents information on polysulfide rubber based, structural sealants, elastomeric compounds said to permanently waterproof joints in metal, glass, concrete, wood and stone construction. Illustrations show applications of sealants, including curtain walls, roofs, copings, sidewalks, geodesic domes, etc. Material is applied as liquid synthetic rubber. (4 pp.)
AIA FILE NO. 24-A
MFR: THIOKOL CHEMICAL CORP.
Circle 318

COATINGS/COMPOUNDS

Recent brochure treats line of protective coatings, including *DEL* synthetic rubber compound. Description, advantages, uses, types and colors of rubber material are presented with photographs of recent installations. Other coatings covered include vinyl copolymer resins, modified epoxies, catalyzed epoxies, roof and siding coatings, acrylic resins, emulsion type coatings, vinyl acetate, latex and acrylics, high heat coatings and synthetic rubber masonry coating.

TOTALLY NEW!...Recessed 2-Foot Wide Luminaires...

Featuring HOLOPHANE PRISMALUME®

Holoflux®

Series 6400

In Two Lens Designs...

Nos. 6400-6410: with Prismatic Border for ceiling illumination *(upper)*

Nos. 6420-6430: with Flat CONTROLENS® for unbroken ceiling lines *(lower)*

Basic units are made in 4-foot lengths (2, 3 or 4 rapid start lamps per section)... Distinctive design integrates with contemporary interiors... stores, offices, terminals, showrooms, banks, drafting rooms, schools and other institutional buildings.

The Only Luminaires Made with ALL these Advantages!

(1): Highest utilization of light; minimum brightness and glare... (2): PRISMALUME (crystal acrylic plastic) for extra-durable service; no discoloration... (3): Supporting cross-members do not project above top of recessed portion of luminaire... (4): Easy adjustment on irregular ceilings or in alteration work... (5): Great versatility; models for major, commercially available, ceiling types... (6): Completely designed and produced by HOLOPHANE — with over six decades of experience devoted exclusively to lighting.

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898

342 Madison Ave., New York 17, N. Y.

THE HOLOPHANE CO., LTD., 418 KIPLING AVE. SO., TORONTO 18, ONT.

Circle 199 for further information about Holophane

A&E NEWS ANNOUNCES

U. S. architects now number 23,981...

Each month, Architectural & Engineering News is the only magazine reaching every registered architect in the United States . . . state breakdown and Audited Circulation Statement (B.P.A.) available upon request.

HOLOPHANE *Invites Your Inquiry*

If you are planning the illumination of a new building—or considering a relighting program—it will pay you to get full information about the years-ahead advantages of Holophane prismatically controlled lighting products. Indicate to your clients the importance of Holophane planned engineering layouts, available without charge . . . For complete lighting data mail coupon immediately, indicating type of area to be illuminated; no obligation.

Send This Coupon, Today!

Holophane Company, Inc.
342 Madison Ave., New York 17, N.Y.

Please send complete engineering data regarding HOLOFLUX Series 6400 and other pertinent material. (Specify area below.) This does not obligate us in any way.

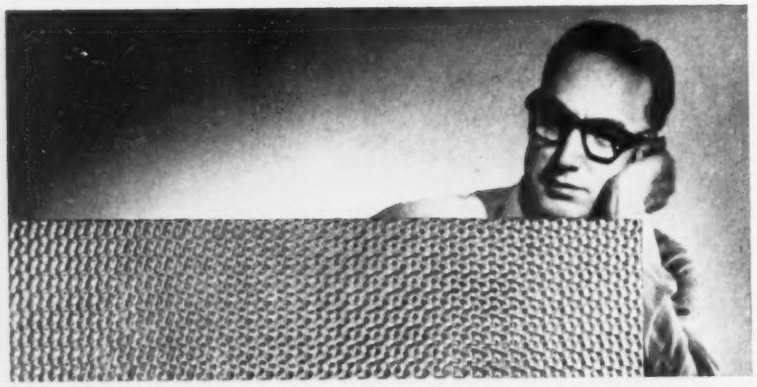
NAME_____

TYPE OF AREA TO BE LIGHTED_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

CRYSTOPAL 71



. . . for soft, diffuse light . . . for high-level illumination

Here's a new concept in lighting glassware: water-white crystals for prismatic control blended with a small amount of opal for diffusion.

The crystal prisms control brightness and at the same time bend light beams down to effect higher illumination levels.

The opal reduces reflected glare, giving better panel obscurity to the light source.

It's made by Corning. Never sags, warps, or discolors. Cuts maintenance costs to the price of a damp cloth.

For troffers, shallow surface-mounted fixtures, and suspended luminaires.

Get complete data from Lighting Sales Department, 30 Crystal Street, Corning, New York.

CORNING GLASS WORKS

CORNING MEANS RESEARCH IN GLASS

Circle 130 for further information

Chemical resistance chart is provided. (16 pp.)

AIA FILE NO. 24-A

MFR: DAVID E. LONG CORP.

Circle 319

FELT TAPE

Topical folder describes uses of impregnated felt tape in building and construction industry. Uses in window glazing, curtain wall panel-back glazing, metal panel sealing, compression gasketing, bi-metal separator and mirror backing are included.

AIA FILE NO. 26-B

MFR: COAST PRO-SEAL & MFG. CO.

Circle 320

EPOXY COMPOUNDS

Technical bulletin describes six epoxy compounds for bonding, patching, joint and crack sealants, surface coatings for concrete, and for resurfacing of pavements. Detailed information and glossary.

AIA FILE NO. 7

MFR: SIKA CHEMICAL CORP.

Circle 321

WOOD TREATMENT

Technical bulletin affords information on Pentachlorophenol, a wood preservative marketed as *Chlorophen*. Mfr states material protects wood products from decay and insects' harmful effects. Description of product, advantages and application information are presented, in addition to listing of physical properties, packaging data and precautions for use. (8 pp.)

AIA FILE NO. 25-B-17

MFR: REICHHOLD CHEMICALS, INC.

Circle 322

EQUIPMENT

FOOD HANDLING

Recent booklet is compilation of photographs of food service equipment in installations in 41 states, Canada and the British West Indies. Additional list of recent installations is included.

AIA FILE NO. 35-C

MFR: SOUTHERN EQUIPMENT CO.

Circle 323

POOL EQUIPMENT

Current literature for architects gives descriptions of diving stands, ladders and deck equipment, underwater lights, built-in skimmers and fittings for commercial swimming pools. Units are available in stainless steel, galvanized steel and chrome plated brass. Photographs, diagrams, and specifications shown (8 pp.).

AIA FILE NO. 35-F-2

MFR: PARAGON SWIMMING POOL CO., INC.

Circle 324

LITERATURE

GAS EQUIPMENT

Commercial gas cooking equipment is subject of recent catalog. Text presents advantages of gas heat for cooking in such institutions as schools, hospitals, hotels, restaurants and cafeterias. Features on all items in line are pictured and explained. Sections are devoted to heavy duty ranges and equipment, miscellaneous units and restaurant ranges and equipment.

AIA FILE NO. 29-F-3

MFR: MORLEY MFG. CO.

Circle 325

WASHROOM EQUIPMENT

Recent brochure depicts washroom equipment and accessories in various types of plant and office applications. Coverage is given to efficient traffic flow in wash and locker rooms as well as to equipment. Described and pictured are: floor drains, lighting, lockers, maintenance, shower rooms, ventilation, towel dispensers, lavatories and washfountains. (34 pp.)

AIA FILE NO. 29-LC

MFR: SCOTT PAPER CO.

Circle 326

BEVERAGE SYSTEMS

Intended for architects and engineers, current booklet describes *Sodamaster* beverage dispensing systems for remote or single, self contained installations. Among aspects treated are adaptations, operation, typical restaurant layouts, detail drawings of units and specifications. Units available in 87 models. (26 pp.)

AIA FILE NO. 35-C-4

MFR: CARBONIC DISPENSER, INC.

Circle 327

ELECTRICAL UNITS

FARM WIRING

Planning Modern Farm Wiring, is booklet designed to provide information to those concerned, on wiring and electric equipment in agricultural buildings. Underground wiring is covered, and electrical question and answer section is included. Photographs and wiring layouts are presented for such structures as: home; milking parlor; stall barn; and machinery shed. Individual copies are $.25. (20 pp.)

AIA FILE NO. 31-C-6

ASSN: FARM ELECTRIFICATION BUREAU, NATIONAL ELECTRICAL MFRS. ASSN.

Circle 328

CIRCUIT BREAKERS

Recent bulletin describes ratings, specifications and operating characteristics of diversified line of molded case circuit breakers. Units range from smallest, for lighting circuit protection through *Cordon* line with 100,000 amp interrupting capacities, to special purpose breakers. Reference chart illustrates type of breaker and provides information on ratings, overcurrent devices, accessories and modifications. (40 pp.)

AIA FILE NO 31-D-4

MFR: I-T-E CIRCUIT BREAKER CO.

Circle 329

TRAFFIC CONTROLLERS

FT-300 Series of electronic traffic controllers, featured in recent literature, are designed for efficient and economical traffic control at intersections where multi-purpose systems are not required. Descriptions, mounting arrangements and typical installations are cited, in addition to traffic signals to be used in conjunction. (4 pp.)

AIA FILE NO. 31-i-44

MFR: CROUSE-HINDS CO.

Circle 330

CHARGER SELECTION

Technical data available, to aid in selecting and using specific models of constant-voltage, silicon-rectifier (UR) chargers for stationary type batteries. Chargers reportedly provide most accurate voltage control available for stand-by battery charging in electric utility service, in emergency power, emergency lighting and in other float-charge applications. Curves and statistics on charger performance at various electrical loads, diagrams and instructions for installing associated alarms and ground detection systems are included. (18 pp.)

AIA FILE NO. 31-A-62

MFR: EXIDE INDUSTRIAL DIV., THE ELECTRIC STORAGE BATTERY CO.

Circle 331

INSTITUTIONAL FIRE ALARMS

Line of fire alarm systems for schools, hospitals, industrial, institutional and public buildings is depicted in recent catalog. *March Time*, master coded, and box coded systems emphasized. Components and accessory equipment such as detectors and signals, are included in addition to specifications. (36 pp.)

AIA FI'E NO. 31-i-31

MFR: THE STANDARD ELECTRIC TIME CO.

Circle 332

OFFICE AIDS

DRAWING SYMBOLS

Plastic template and explanatory guide are now available, presenting standard symbols for signalling systems. Guide explains application of symbols to architectural drawings. Purpose of development of symbols is to promote greater understanding between designers and suppliers of

equipment. Said to be applicable to hospital nurse call systems, paging systems, fire alarm and sprinkler systems, public and private telephone systems and watchman and sound systems.

AIA FILE NO. 31-LC

ASSN: SIGNALLING APPARATUS SECTION, NATIONAL ELECTRICAL MFRS. ASSN.

Circle 333

FILING CABINETS

Aristocrat IV filing cabinets are treated in current literature. Among features stressed are: strong, rigid and durable frame construction; extra reinforcement to prevent buckling; finger tip release drawer latches; greater capacity; and ability to handle variety of record sizes, card or paper, in addition to usual correspondence sizes. Engineering details and dimensions are presented for line. (12 pp.)

AIA FILE NO. 35-H-42

MFR: REMINGTON RAND DIV., SPERRY RAND CORP.

Circle 334

ADDING MACHINE INSTRUCTIONS

Recent publication offers instructions for multiplication and division on standard adding machine. Method reported to save hours; can be mastered in minutes. May be adapted to invoice discounts, payroll computations, percentage division, etc. Chart for reciprocal division also included. (6 pp.)

AIA FILE NO. 35-H-3

MFR: VICTOR ADDING MACHINE CO.

Circle 335

LIGHTING

ALUMINUM FIXTURES

Diecast aluminum wall bracket and ceiling lighting fixtures, suitable for both indoor and outdoor installation, are subject of current catalog. *Dielux* units are reported as weatherproof and rust proof, in variety of styles. Also included is information on hinged aluminum guards, weatherproof back gaskets, pin switches and convenience outlets. Dimensional drawings and photographs are provided. (4 pp.)

AIA FILE NO. 31-F

MFR: PRESCOLITE MFG. CORP.

Circle 336

LIGHTING BROCHURE

Shallotroffer lighting fixture series, featuring plug-in, unilized electrical assembly, is subject of current brochure. Presented data covers construction and installation features of the recessed units, methods of mounting into ceiling systems and various bottom diffusing elements available. (32 pp.)

AIA FILE NO. 31-F-2

MFR: GLOBE ILLUMINATION CO.

Circle 337

Circle 131 for further information →

Anodized Aluminum ANOTEC*
. . . the new dimension in freedom of design!
Created in SPECTRA-COLORS and GEOMETRIC PATTERNS that add a new concept to interior and exterior applications
Specify ANOTEC* for new construction or modernization! Ideal for sun deflectors, decorative wall panels, spandrels, column facings, window guards, room-dividers, parapet and terrace railings, swimming pool enclosures, patio screens, grilles, louvers, gates, fences, etc.
Complete information and specifications available upon request.
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☐ Please send complete information and specifications on ANOTEC.*
☐ Please have one of your representatives contact me.
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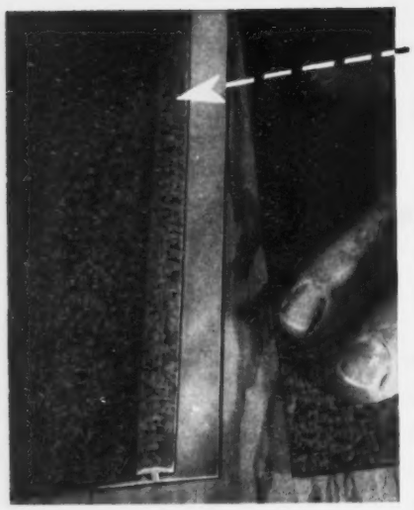

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Circle 132 for further information

LIGHTING ESTIMATOR

Included in 1960 catalog is *Skydome Selector Tables*, intended to facilitate estimates of both amount and type of daylighting units needed for any structure. Unit said to incorporate fundamentals of good daylighting with geographical location, ambient brightness, average weather conditions and illumination engineering theory.

AIA FILE NO. 31-F-1

MFR: WASCO PRODUCTS, INC.

Circle 338

LIGHTING FOLDER

Line of commercial and industrial fixtures, recessed troffers and ceiling systems is presented in condensed, 1960 folder for architects and engineers. Folder stresses *Speedomatic* troffers, recessed units for ceiling systems. Included is index of over 100 types of ceilings and proper type of troffer for each. Descriptions and dimensions are concise. (4 pp.)

AIA FILE NO. 31-F-23

MFR: SMITHCRAFT LIGHTING

Circle 339

WALLS/SIDING

WALL COVERINGS

Two current booklets feature wall covering materials in additional colors. *Weldwood Flexwood* is wood paneling in flexible form; may be applied to flat or curved surfaces, including columns and pillars. Literature presents color reproductions of samples. *Kalistron* and *Kalitex* are a decorative vinyl wall covering and a textured colored material respectively. Applications are pictured in color. (6, 4 pp.)

AIA FILE NO. 28-C

MFR: UNITED STATES PLYWOOD CORP.

Circle 340

WOOD UNITS

Choose Modern Materials is theme of two brochures, one dealing with interior uses of *Presdwood* units, and the other with exterior uses. Interior catalog features *Panelok* wall system, cherry and walnut panels and other types of hardboard panels. Line of exterior products, including range of vertical and horizontal siding materials is stressed in exterior catalog. (each 8 pp.)

AIA FILE NOS. 23-L; 19-D-2

MFR: MASONITE CORP.

Circle 341

ENAMEL APPLICATION

Porcelain Enameling of Aluminum is current guidebook on application of porcelain enamels to aluminum. Alloy selection, metal preparation, choice of frit, slip formulation, enamel application and firing are covered. Also advantages of porcelain enameled aluminum are compared with those of porcelain enameled steel. Recent applications are pictured in color. (22 pp.)

AIA FILE NO. 15-M-1

MFR: REYNOLDS METALS CO.

Circle 342

ENAMELED PANELS

Recent pamphlet describes *Porcelpanels*, exterior panels of porcelain enamel on steel or aluminum with variety of core materials. Varied cores, panel types, extrusions and rolled shapes are described, as well as colors, finishes and textures, weather sealing and advantages of units. Detail drawings portray eight representative panel types, and photographs depict existing installations. Specifications and methods of installation are contained. (8 pp.)

AIA FILE NO. 17-A

MFR: INGRAM-RICHARDSON MFG. CO.

Circle 343

MISCELLANY

WELDING MANUAL

Fifth edition of *Manual for Structural Welding Practice* is offered, as guide to welded steel building frames. Theory of welded connections is presented with specifications and abundant detail drawings. Illustrations and allied information treat, among others: continuity of design; design tables; typical applications; standard symbols; trusses; wall details; tables of beam sizes; and allowable loads. (60 pp.)

AIA FILE NO. 13-C-2

MFR: SAXE WELDED CONNECTIONS

Circle 344

GLAZED CONCRETE

Aristocrat Block, glazed concrete masonry unit, reported to enable erection of finished, load-bearing wall in one operation, is described in recent brochure. Product is standard concrete block with terrazo-like face, in permanent bond. Qualities, features, typical installations, standard unit sizes available and specifications contained. (8 pp.)

AIA FILE NO. 10-B

MFR: ARISTOCRAT ASSN. OF AMERICA

Circle 345

SILENCING UNITS

Current data sheets available on four types of silencing equipment for industrial areas. Sheets illustrate and describe type *UR*, for maximum silencing performance, type *US*, for average silencing, type *UC*, for non-critical silencing and type *UT*, turbo-charged engine chargers. Pressure drop and noise level charts are provided for each type, in addition to dimensions and detail drawings. (4 sheets)

AIA FILE NO. 34-H

MFR: UNIVERSAL SILENCER CORP.

Circle 346

RESILIENT FLOORING

Brochure, 1960 edition, describes *PermaCushion* floor system, said to have cushioned resiliency and dimensional stability. Designed for installation on concrete slab, but is adaptable for any firm, level surface. Text treats of maple flooring, nailing, resilient pads, etc. Specifications and diagrams are provided. (4 pp.)

AIA FILE NO. 19-E-9

MFR: ROBBINS FLOORING CO.

Circle 347

PIPES/TUBING

Catalog is available showing types, sizes, weights, strengths, velocity and flow characteristics for line of copper water tube, *DWV* copper drainage tube, copper refrigeration tube, brass and copper pipe and plumbing brass goods. Information is provided for design, estimation and specification of tube and pipe requirements for any installation of plumbing, heating, refrigeration equipment or air conditioning. (8 pp.)

AIA FILE NO. 29-B-4

MFR: BRIDGEPORT BRASS CO.

Circle 348

FLAME-CUTTING UNIT

Recent brochure describes addition to line of flame-cutting machines. *Linagraph* is of pantograph design, suitable for straight line and shape cutting on 8′ steel plate, used in medium duty production. Design, construction and operation of unit are discussed. Principal features stressed: centralized operator control; pantograph design; motorized torches; and adaptability to various tracing devices. (8 pp.)

AIA FILE NO. 35-i

MFR: AIR REDUCTION SALES CO., DIV. AIR REDUCTION CO., INC.

Circle 349

METAL LATH SPECIFICATIONS

Specifications for Metal Lathing and Furring offered as reference work, covering all phases of metal lath construction. Booklet contains fire-resistive ratings, design tables and specifications for hollow partitions, solid partitions, sound insulating partitions, ceilings, vertical furring and centering. Sections related to materials and corner joint reinforcement also included. (20 pp.)

AIA FILE NO. 20-B-1

ASSN: METAL LATH MFRS. ASSN.

Circle 350

DOCUMENTS

Air-Conditioning and Refrigeration Institute, *1364 Connecticut Ave., N. W., Washington 6, D. C.*

ARI Standard for Centrifugal Liquid-chilling Packages, *ARI No. 550-59. $.40.*
Designates what shall constitute "standard equipment" on centrifugal liquid-chilling package.

American Concrete Institute, *P. O. Box 4754, Redford Station, Detroit 19, Mich.*

ACI Book of Standards, *1959 Edition. 382 pp. $5.00.*
Compilation of 15 ACI Standards, recommended practices and specifications. Covers such subjects as building code requirements for reinforced concrete, winter concreting, hot weather concreting, selection of proper proportions for concrete and the measuring, mixing and placing of concrete.

U.S. Department of Commerce, *National Bureau of Standards, Washington 25, D. C.*

Screw-Thread Standards for Federal Services, *1957 Part II, National Bureau of Standards Handbook H28 (1957), issued 1959. 119 pp. $.75.*
This volume is the second of a series of three into which the 1957 edition of NBS Handbook H28 is divided. Covers standards for screw threads which are commonly applied to bolts, screws, nuts and other similar fasteners.

Superintendent of Documents, *Washington 25, D. C.*

Application of the Floor Furnace in the Heating of Small Houses, *Catalog No. HH 1.9 a:9. $.15.*
Explains fundamental principle of the floor furnace, and describes its application to the heating of small houses.

Methodology of Statistics on Research and Development, *published by National Science Foundation, 1959. $1.25.*
Consists of proceedings of a special session on R&D statistics conducted during the American Statistical Assn. annual meeting, December 1958. Includes four papers presented at the session and the resulting discussions.

THE ONLY RECEPTACLE THAT PROTECTS 2 WAYS
1. Shunts current harmlessly away from objects inserted in slots by children.
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SG-62 SAFETY GROUNDING RECEPTACLE
15 AMPERES, 125 VOLTS

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Remember, this is the only device on the market which combines grounding with the shunting action that Hubbell introduced in the famous SP-49 Safety Plus receptacle many years ago.

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Circle 133 for further information

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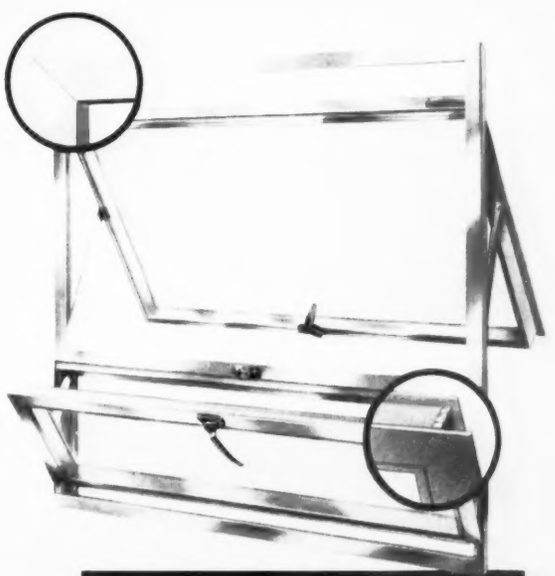

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NAMES

Charles R. Colbert, AIA Tall, urbane Charles R. Colbert, AIA, brings a background distinguished by great interest and accomplishment in the areas of architecture, education and research to his recently appointed role as dean of the Columbia University School of Architecture. A senior partner of Colbert and Lowrey and Associates, New Orleans architectural, design and city planning firm, Mr. Colbert succeeds Leopold Arnauld. He will assume his duties on April 1. Colbert has been granted a leave of absence for the first three months of his new deanship to inspect other centers of architecture in the United States and Europe and to compare and evaluate educational techniques.

In accepting the Columbia post, Colbert stated: "I am convinced that Columbia's School of Architecture can and should become the most contributive academic force in twentieth century architecture. To accomplish this, these objectives should be placed before the School: to prepare the future architect, to inspire and assist the active professional, and to inform the public at large of the aims and obligations of the architectural profession. A prime essential for the School is an academic and administrative climate allowing reasonable academic experimentation and opportunities for real community service projects. There must be room for needed educational experimentation and search for educational method, even at the cost of failure. An energetic, spirited, and even inspired teaching and research staff must be maintained, and outstanding students must be attracted to the School and challenged to their ultimate potential."

The new Columbia dean is a member of the American School Commission of the American Assn. of School Administrators. The commission, comprising eight educators and two architects, is now publishing a study on the design of American school buildings. Mr. Colbert also recently served as one of ten architects selected by the Educational Facilities Laboratories of the Ford Foundation and the University of Michigan to design hypothetical structures to house a secondary school program developed by Dr. J. Lloyd Trump of the University of Illinois.

Born in 1921 in Dow, Oklahoma, Colbert received the Bachelor of Architecture degree from the University of Texas in 1943 and later took graduate courses at the University of Michigan. From 1943 to 1946 he served with the U.S. Navy Construction Corps, Bureau of Ships. In 1947 he received a Master of Science degree from the Columbia School of Architecture. Later he took law courses at Loyola University of New Orleans.

From 1947 to 1949, Colbert was assistant professor of Architecture at Tulane University. He then practiced architecture and served as supervising architect and director of the Office of Planning and Construction, Orleans Parish School Board in New Orleans. In 1952-56, Colbert was a visiting lecturer in city planning at Tulane, as well as a practicing architect and city planner. In 1956-57, he directed the Division of Architecture at the Agricultural and Mechanical College of Texas, College Station, Texas.

Projects typical of Colbert's architectural design and planning are: the 150-unit Motel de Ville, New Orleans, selected by U.S. State Department for inclusion at the International Trade Fair, Vienna, 1956; the Wheatley Elementary School, Orleans Parish School Board, top award, *The School Executive* better school design competition, 1954, shown by U.S. State Department in Berlin, 1957, and Moscow, 1958; Diaz-Simon Clinic, New Orleans, AIA honor award, 1959; and his own residence in Metairie, La. (1958), which received honorable mention from the AIA.

Colbert is a past-president of the New Orleans Chapter of the AIA. He is a member of the Louisiana Architects Assn., American Assn. of School Administrators, American Planning and Civic Assn., National Council of Schoolhouse Construction, and Tau Beta Pi, and an affiliate member of the American Institute of Planners.

EDITORIAL

Forward to yesterday—for some!

By the year 1970—a brief decade away—the population of this nation will increase 50 million to an all-time record high of 225 million souls. By the end of the century, the population of these United States is expected to reach the phenomenal figure of 350 million!

It doesn't take any unusual stretch of this architect's limited imagination to realize the penultimate effect this "explosion" of persons will have on the urban landscape. More highways, bathtubs, TV sets, houses, schools, hospitals, shops, more—more of everything—in greater measure of quantity and quality is already on the horizon. The estimated dollar volume of new construction in the next ten years alone is expected to equal the value of all construction built in the U.S. from its colonial days to the present!

This enormous and sky-writing fact may be too much to grasp at first reading. The "soaring sixties," as the approaching decade has come to be fashionably known, places a grave responsibility on all citizens. And since we primarily address a readership of architects and consulting engineers—we believe that—the physical development of this decade places a most onerous responsibility on this group—above others. We are mindful of the impassioned words of AIA President John Noble Richards in response to an inquiry by this publication, in which he stated, "Our urban culture is in mortal danger."

President Richards reminds us that all of our impressive advances in securing technological convenience and increased leisure are of no avail as long as we are surrounded by growing ugliness and confusion in our cities. He states further the need for "a coordinated approach to the organization of urban space which has become our most precious commodity. This coordination—the integration of technology and humanism in building for people—requires the teamwork of all segments of the building industry under the leadership of the architect who must rise to the challenge of our need for the twentieth-century master-builder. He must reunite technology and art under the supremacy of design."

The words of President Richards are gaining new meaning as the mo-

EDITORIAL

mentum of the activity of many architects and their professional societies throughout the country is being realized within their communities by participation in civic design and planning programs. It is heartening to report, based on a recent cross-country personal observation—that the architects are in the forefront in urban-improvement.

Perhaps the most dramatic position on this larger type of issue has been that of *Architects Council of New York* together with the *New York Chapter of the AIA* in endorsing, in substance, the proposed new zoning resolution for the City of New York. These societies issued a call to all dedicated citizens and organizatnons to join the architectural profession in the effort to secure zoning which answers the needs of the future—and not the past.

Therefore, it is with considerable astonishment and subsequent regret that we must report that the most intense organized opposition to this position came from the Code Committee of the Metropolitan Chapter, President's Council, of the New York State Society of Professional Engineers. This opposition, in the form of a press release, was mailed in the same envelope from the same public relations firm representing The Real Estate Board of New York, Inc., who also enclosed an opposing statement. These gentlemen are entitled to their views. No one questions their privilege in making them known. What are they? The Professional Engineers' Code Committee attacked the zoning resolution in its entirely as "unworkable, unenforceable and unrealistic" and that "it is not the product of practical people." The allegedly "impractical" people they are attacking are the respected and long-established architectural firm of Voorhees, Walker, Smith, Smith and Haines who were retained by the City Planning Commission to prepare this comprehensive program —a product of over two years of careful study. The Engineer group further embroider the language of its previously emotionally-stated comments with the relatively non-scientific suggestion that this plan should "get lost." These statements together with a few more innocuous charges and barbs, paralleling the position advanced by the realty group in the com-

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DIGEST:14

HEATING AND AIR-CONDITIONING IN MODERN BUILDINGS

From a talk by Charles Broder, PE, Staff Mechanical Engineer of the New York Port Authority, delivered before a meeting of the New York Chapter of the American Institute of Architects on December 15, 1959.

Building planning and design must account for two very basic criteria. These basic fundamentals can be identified as follows: (1) functional operational requirements; and (2) environmental conditioning.

The first of these does not vary very much from the functional operational requirements that have been basic over many years, except that they must be up to the standards imposed by modern industry, commerce and good management practice. The necessary structural areas for operational requirements—entrances, exits, halls, vertical transportation, light, heat, ventilation, minimum sanitary facilities, minimum fire protection—can be provided within building code requirements to a sufficient extent to achieve production by personnel. This is not enough, in itself, to achieve maximum production without application of some form of environmental conditioning. The degree of application will depend upon the goals set up in the primary functional operational requirements.

While there are no accurate means available to measure the possible or probable increase in production due to better environmental conditions, it has been the feeling and the opinion of various levels of management that an employee working in a comfortable atmosphere does better work and has less incidence of absenteeism. There has been some individual testing by some firms that, although fragmentary, seems to point in this direction. Dr. R. G. Clarke of the University of Hartford indicated recently that there is some hope that definite research on this subject will be done in the near future. How would one define environmental conditioning? Let us advance a definition for consideration and then indicate at least the major items that make up the controllable conditions.

Definition

Environmental conditioning provides, for the maximum number of people, a high degree of working comfort within pleasant surroundings.

This definition applies equally to the home as well as industry and commerce. Perhaps it should be reworded to the extent that may be required for different applications but at the moment it seems to be applicable as a very general definition to all forms of building planning.

It is recognized that there are difficulties in trying to provide the conditions that would be most applicable for all people or even for the maximum number of people in any one area. There are many variable factors within the human body that do not react to the same conditions in a similar manner. The physiological factors of sex, age, body physique, nervous energy and others vary considerably. The psychological factors of background, habit, personality, previous environmental conditioning and others also vary in all people to a great degree. The adaptation of the body to environmental conditioning is very different for most people. Therefore, if the conditions imposed are acceptable to a maximum number of people, the conditions may be deemed satisfactory.

Let us look at the major factors in environmental conditioning and how they are being achieved in formulating building planning and basic design criteria.

Environmental conditioning factors

1. Surroundings—The size of the room, the color and material placed on the walls, floor and ceiling, and their relationship to each other, can have a pleasing effect or an irritating effect. This is a major problem that, to date, architects have shown tremendous interest in solving and have solved.
2. Light—The illumination of a room, light intensity, source, area of source, contrast, etc., is a most important factor. The lighting engineers are constantly researching on this subject and have done some marvelous work. Since the lighting of an area must blend with the size and color scheme of the room, there must be a very close working arrangement between the architect and the lighting designer.
3. Air-conditioning—The application of adequate air-conditioning involves many factors and their relationship and interaction. Since this major condition of environment is the base of the theme of this talk, let us take a look at the main factors involved. Later on we will discuss just how we bring about the condition we need for a correct environment. We must control air by its:
   a. Temperature—level, location of control source, fluctuation.
   b. Humidity—level, location of control source, fluctuation.
   c. Movement—direction, speed, range of speed, fluctuation, part of body affected.
   d. Foreign matter—dirt concentration, pollens, carbon dioxide concentration.
   e. Odor—type, quality and amount.
   f. The interaction of the various factors and the result of the total action on the body.

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4. Sound—Type, complexity, frequency, whether continuous or intermittent, range or amplitude, relation to environmental or surrounding sound. The sound imposed in an area occupied by people can have a tremendous range of influence from an environmental standpoint. Sound control has been a subject of great interest because of its influence, under certain conditions, on the human mind and body and the reactions created by the imposition of various types of sound in the presence of people. Properly controlled, sound can be most beneficial in the productivity of people. Music, for example, properly controlled has helped in many industries while uncontrolled noise has a most disrupting effect. Sound control engineers and experts form a valuable team for consultation for the architect.

The over-all interaction and combination of the above variable major items constitute the controllable factors in environmental conditioning.

Planning

The need to achieve a happy combination between functional operational requirements of a building and the environmental conditioning during the planning stage is of extreme importance. A close liaison must be established between the various expert consultants and the architect very early in the initial planning stage when the basic criteria for all sections of the building is being established. It is during this stage that the blending of the engineering effort and the architectural concepts must take place. It is important that this liaison be maintained during all phases of the planning and design and down through the actual construction on the site. Far too often all the good work that is accomplished during the initial planning stage is wasted effort because the close working arrangements established are allowed to fall apart and the initial concepts are changed but not in happy accord. The usual result is that neither the architecture or the engineering gain by such discord and interruption of planning. In fact, the final work done in the field construction is usually unsatisfactory to the engineer and the architect and in probability the client is not too happy. If for cogent reasons it really becomes necessary to make changes in the plans, agreement should be reached for a new criteria that will keep intact the only means of getting a functional and environmental conditioned building.

The degree that environmental conditioning is built into the plans for any structure is dependent upon the financial budgeting for the project and the final approval of the client. It is my opinion that the architect should try to keep the best possible balance between functional and environmental planning for the sake of the project and the client.

Air-conditioning

One of the most important factors in building environment is the subject of air-conditioning. There is probably no building of any importance today that is not thoroughly air-conditioned. In the very near future, there will be no building that doesn't have air-conditioning as a major installation.

The same elements that we have had available to us over the years are still the same basic elements we use today. The main difference is that we have acquired a greater knowledge of their uses and control, and we have available materials and equipment to make use of this knowledge. These elements are:

1. Air—at various levels of temperature and humidity and dust and odor controlled.
2. Water—at various temperatures ranging from 40° F to perhaps 400° F, and steam at different pressures.
3. Electricity—used on the production of heat within a space.

The methods employed in the use of these elements in a building depend on the basic criteria adopted in the initial planning stages. Manufacturers have available on a competitive basis all of the materials, equipment and controls that are necessary. They will give the planners and designers all the information that they have on the best means of using their products, their capabilities and availability for the project on hand. Most of the manufacturers have also incorporated in their equipment and products, some degree of appearance that could be used in modern architectural concepts and have considered the operational and maintenance problems in modern buildings.

Equipment and application

Modern air-conditioning calls for modern equipment and application. In air-conditioning a building today, we use all of the elements in profuse combination through controls and closely related equipment. Of the factors in air-conditioning that have to be controlled for a proper environment, temperature, humidity and air movement are the most important. The others are contributory to a total environment.

In a large modern system, the control of temperature is dependent on the range of temperature given to the main element water, which invariably is the controlled base medium. We accomplish this by the use of steam boilers or hot water generators to heat the water to the pressures and temperatures we need. The steam or hot water can then be used as a direct source of heat to an area by means of convection or radiation equipment in the areas to be heated and with the necessary piping from the boiler or generator. Where the heat must be transported over a considerable distance or where process heat is needed, steam or hot water at elevated temperatures and pressures are created and used through the medium of heat exchangers to provide so called medium or low temperature hot water and medium or low pressure steam at the point of final usage.

Ultimately the heat available in the water must be transferred to the air and the walls, floor and ceiling in the heated area to provide the environmental condition desired. This can be done through the use of radiators of various types, fan-coil units, high velocity induction units, coils in air distribution systems and radiant panel systems in floors and ceilings. In a modern air-conditioning system, it is rather common to use a complex system combining all features of heat transfer means to the heated area.

In a somewhat similar manner, water is cooled through the use of the refrigeration machine so as to enable us to use it as a basic medium to absorb heat from an area or space, thus again achieving environmental control. Through the use of reciprocating refrigeration machines or centrifugal compressors using chemical refrigerants and the absorption machines using salt and water as means of cooling, we have available a variety of adequate and efficient equipment to fit all conditions of installation design imposed. Here again heat is absorbed by the cooled water through the use of fan-coil units, coils in air distribution systems, high velocity induction units and radiant panel systems and a variety of combination of units.

The humidity in a room can also be controlled by the use of the same basic hot and cooled elements. With the use of air washers on hot coils, moisture can be added to the air to provide the correct water entrainment and the desired humidity level or steam coils can be used as a means of causing water to evaporate into the air stream to the desired level of humidity. Various other

EDITORIAL

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panion release, are essentially the sum and substance of its contribution to the *public problem* of congestion of a great metropolis! These releases (emanating under the aegis of the same public relations firm) were directed at discrediting before the eyes of the lay-public the thinking of the architectural profession as that of "starry-eyed" dreamers. It would have been of more profit and of significant moment had these persons directed their precious energies to a more thoughtful *reading* and scientific critique of the zoning proposal rather than utilize the devices of tasteless press-agentry to confuse the public in attacking the work of their professional collegues and other public-spirited New Yorkers as "impracticable."

In discussing the New York AIA Chapter's report, its president, L. Bancel LaFarge, FAIA, declared, "A lot of twaddle is rampant that a new zoning resolution replacing the existing obsolescent code will be a straightjacket for the City. People who believe that—if they really believe it—must by inference consider all regulations and laws as straightjackets! Civilization progresses by means of intelligent regulation of the individual when he comes in conflict with the public good. . . . We are going to fight the good fight to see that this City gets new zoning."

May this architect, raise his small voice and say, that architects and professional engineers need more liaison in these matters. They need to understand each other's approach more clearly—not only in New York—but everywhere in America.

A great and awesome measure of the total well-being of our nation rests in the hands and hearts and minds of these professional disciplines. In our view it would be better to fail in attempting exquisite things than to succeed in the department of the utterly contemptible. This coming decade with its far-reaching promises for good, places this nation at a fresh crossroads in its cultural growth. We, as members of these professions cannot fail in this pursuit of enlightenment —shedding light in the darkness of urban sprawl, ugliness and physical disorder. It is this pursuit that makes our professions worthwhile and certainly life for everyone a bit more meaningful and richer. *JJC*

BOOKS

TOWN AND SQUARE—*From the Agora to the Village Green by Paul Zucker. New York: Columbia University Press, 1959. 287 pp., illus. $15.00.*

"The fact is that architecture is a more difficult and intellectual art than music. Music—that's just a faculty you're born with, as you might be born with a snub nose. But the sense of plastic beauty—though that's, of course, also an inborn faculty—is something that has to be developed and intellectually ripened. It's an affair of the mind; experience and thought have to draw it out." This quotation from Aldous Huxley serves as a fitting curtain-raiser to this highly civilized work by Dr. Zucker.

The book, in its graphic and mechanical presentation is an act of love —the selection of photographs and line cuts used to illustrate the intellectual materials contained in this book are of an excellent and inordinately high caliber. This may seem an odd approach to reviewing the author's work—however, in reality, it is the initial contact one has with the work. Before the reviewer is misunderstood—this is not a "picture book" with captions and supporting text. Mention is made of the physical presentation because it engenders a warmth and sympathy for the wealth of scholarly investigation about town and city planning from the archaic periods up through the fullest European development of the 19th century. The study continues overseas to our shores for a survey of the early American public square in a chapter prepared by Carl Feiss, AIA.

Dr. Zucker deplores the "overrationalization" by contemporary city planners whereby they have synthesized the "square" as a function of traffic, demographic distribution, zoning, *et al.*—all those quasi-objective criteria which even the most sophomoric architectural student has come to quote by rote. Indeed this "overrationalization" may be deplored because perhaps it has clouded our view of the "square"—robbed us of its spiritual importance (there is such a thing) and sapped the vibrancy and validity of sheer human experience from the architectural and planning scene.

Therefore, it is refreshing to note

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DIGEST:14

means are available on the market for the injection of moisture into the air. In a similar manner, cooled or chilled water can be used in an air washer to cool the spray water below the dewpoint of the conditioned air so that it cools the air stream passing through the spray water and gives up heat and moisture to the spray water. This reduces the moisture in the air to the required level for proper conditioning.

So far, we have been considering the means of controlling the temperature and humidity in an area through the basic control of water temperatures and the transfer of heat to and from the surrounding air. Even with a complete radiant panel system, heat is imposed on the surrounding walls, floor and furniture and in the balancing of the environment, the heat is ultimately given off to the surrounding air. Similarly, in a radiant cooling system, the heat absorbed from the walls, furniture and other elements in the room is replaced in these items by absorbing heat from the surrounding air and thus reducing the temperature of the air to a balanced level. However, the control of air required for ventilation and humidity levels can only be accomplished through an air distribution system. That is why, regardless of the basic type of heating and cooling used for air-conditioning, an air distribution means must always be incorporated.

The concentration of foreign matter in the air is controlled in the air distribution system for air-conditioning. This is accomplished by the use of a number of types of mechanical and electrostatic air filters available on the market. The use of filters in any system depends upon the dirt concentration problem in the area of the building and the degree of filtering desired. The type filter and the use of combination of types of filters, as is often done, is dependent on the problem at hand and must be solved by the engineer.

The problem of odor in most air-conditioning systems is usually of a minor nature and generally does not require any specific treatment. On occasion, due to atmospheric conditions surrounding the building, certain odors penetrate the building through the air distribution system and action must be taken to eliminate them. The use of air washers, particularly where the odors are carried on very minute particles of dust that get through the air filters, can be most effective to minimize the problem or eliminate it entirely. There are many items that are offered on the market that at times make claims to being effective in odor control. Some of these are worthless under all but specific conditions, others are merely masking agents substituting one odor for another, some have a certain worth as absorbing agents for specific odors. The most universal one that still seems the most effective is activated carbon. It still has the property of a very excellent absorber of most odors. Therefore, each odor problem has to be carefully considered by the engineer and the best available solution applied.

As mentioned above, the three most important factors in air-conditioning are temperature, humidity and air movement control in an area. If they alone are controlled for proper interaction and are supplemented by sufficient ventilation and control of foreign matter, the problem of environmental conditioning stemming from air-conditioning would be solved. Now, the secret of temperature and humidity control has always been in the ability of the system to establish and maintain levels of comfort in both these categories with a very minimum of fluctuation. In the past, it has been somewhat difficult at times to get and maintain temperatures and humidities at prescribed levels. The electric, pneumatic and electronic controls available today have been developed so that adequate control is no longer the problem child of the industry if properly applied. The problems can occur when application of the proper type and number are skimped on to save costs or on an "it's good enough" attitude.

The feeling of "draft" can normally be traced to lack of control in air movement where the temperature and humidity are correct. The source of the air in a space, the speed, direction and part of the body over which the air flows contribute in varying degree to the discomfort from this source. The reasons for this condition to occur can generally be traced and corrected. Usually it is found that the condition need never have been imposed on the area if the original planning and design criteria had been clearly thought out before design was started.

Various systems

Let us give some names to various systems that are used in the air-conditioning of the modern building. These are the common applicable names although by no means all of them.

1. Low pressure air systems—This is probably the type most universally used thus far. It generally consists of a system of ducts through which the air is distributed to the controlled areas by means of fans. It also normally contains the heating and cooling and humidifying equipment and all the necessary controls. It derives its name from the fact that the air pressure in the ducts and the velocity of the air through the ducts are maintained at minimum levels consistent with good practice and medium costs.
2. High pressure air systems—This type of system is increasing in use due to the increasing need for conditioning along with the increasing needs for many other utilities in the buildings. As the available space for equipment and transmission lines and ducts decreases, the high pressure system is resorted to so that a greater quantity of air can be obtained through the same size of duct. In other respects, it is similar to the low pressure system except that operation is carried on at a higher pressure of air within the ducts, velocities are greater, the ducts must be made stronger to withstand the pressures and provisions must be made for local distribution and control of noise.
3. Dual-duct systems—This is merely an extension of the high pressure system to two ducts operating together, each at a different temperature and condition so that quantities of each can be mixed through mixing boxes in the air streams to arrive at the proper condition of air to be distributed to the room.
4. Perimeter heating—This is a means of distributing heat through the use of baseboard radiators, cast iron radiators or convectors, and non-ferrous radiators and convectors using as the medium for transporting the heat a form of hot water or steam.
5. Radiant panels—This is a system of providing a means for supplying heat to an area through the use of radiant energy contained in the heating medium or provided by a heat producing medium. Thus use can be made of warm air, hot water or electric wiring in the walls, ceiling or floor to elevate the surface temperature of the enclosure and provide a source of radiant heat energy. Chilled water circulating through pipes in the surrounding surfaces can provide a means of absorbing heat from the area and become a radiant cooling panel.

So all of the various systems and their combinations can be used to give to any building the environmental conditioning so necessary in providing good working conditions for increased production and living comfort. The basic secret is in the planning in the initial stages and the establishment of over-all criteria for all designers in close cooperation.

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BOOKS

(Continued from page 49)

that Dr. Zucker has chosen to examine the fundamental importance of the square as a basic factor in town planning—as the "very heart" of the city. Accordingly, he has directed his interest toward that "central formative element" which makes a community—a community and not a mere collection of persons. He searches for the humanizing element of the monumental plaza—its historical development and essential meaning as a focus for personal surrender to a larger psychological identification within the urban landscape. Dr. Zucker has put aside a discussion of these civic elements as works of individual architects or as planning solutions to architectural problems. The author advances the relatively original idea that the history of the square is actually a history of "space" as the subject matter of artistic creation. Therefore, he states that it should be considered separately from a history of architectural design—as a history of aesthetic experience alone.

This may constitute a significant departure in the scholarship traditionally associated with the subject (at least in those works available in the English language). He has demonstrated his thesis admirably in showing the threads of historical continuity and interrelationships from epoch to epoch—national influence to national influence—and from culture to culture.

Accompanying the text is a comprehensive bibliography and index. This book is recommended as a rich resource for the historian, the architect —scholar and practitioner alike and whomever may still appreciate one more stepping stone to aesthetic experience. *JJC*

films

Olympic Village, U.S.A. *produced by Douglas Fir Plywood Assn., Tacoma 8, Wash., 1959. Color, sound, 15 min.*

Shows construction of athletes' quarters and sports facilities at the site of the 1960 Winter Olympics, at Squaw Valley, Calif. Features new methods of component construction, selection and use of materials to be subjected to extreme climatic conditions, as well as action scenes of several of the Olympic events.

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22-27 BANFF SESSION '60: architecture and structure, Banff, Alberta, Canada.

25 THE ARCHITECTURAL LEAGUE OF NEW YORK: national gold medal exhibition of the building arts, held in collaboration with the American Craftsmen's Council through May 15. Museum of Contemporary Crafts, New York City.

29-2 AMERICAN MANAGEMENT ASSN: special data processing conference, Statler-Hilton Hotel, New York City.

Mar. 6-9 FIFTH NATIONAL ELECTRICAL INDUSTRIES SHOW: sponsored by Eastern Electrical Wholesalers Assn., The Coliseum, New York City.

7-11 AMERICAN SOC OF CIVIL ENGRS: national convention (first of three in 1960), New Orleans.

13-14 NATIONAL HOUSING CONFERENCE: annual convention, Statler-Hilton Hotel, Washington, D. C.

14-17 AMERICAN CONCRETE INST: convention and exhibit, Hotel Commodore, New York City.

21-23 FIRST NATIONAL ELECTRIC HOUSE HEATING EXPOSITION: sponsored by Electric House Heating Equipment Section, National Electrical Manufacturers Assn., Sherman Hotel, Chicago, Ill.

April 5-7 BRI: spring conferences, Statler-Hilton Hotel, New York City.

18-22 AMERICAN INST OF ARCHITECTS: annual convention, San Francisco, Calif.

May 1-4 AIR-CONDITIONING AND REFRIGERATION INST: board and annual meeting, The Homestead, Hot Springs, Va.

11-16 WORLD DESIGN CONFERENCE, Sankei Kaikan, International Hall, Tokyo, Japan.

12-14 AMERICAN INST OF ARCHITECTS: south Atlantic regional conference, Winston-Salem, N. C.

23-26 DESIGN ENGINEERING SHOW: Coliseum, New York City.

June 20-22 AMERICAN SOC OF REFRIGERATING ENGRS: annual meeting, Royal York Hotel, Toronto, Canada.

26-1 AMERICAN SOC FOR TESTING MATERIALS: annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

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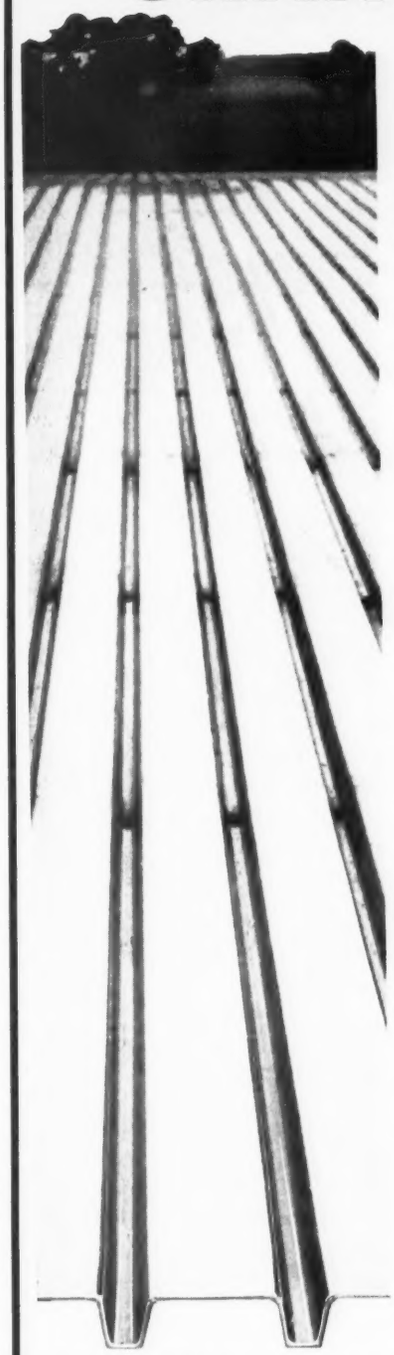

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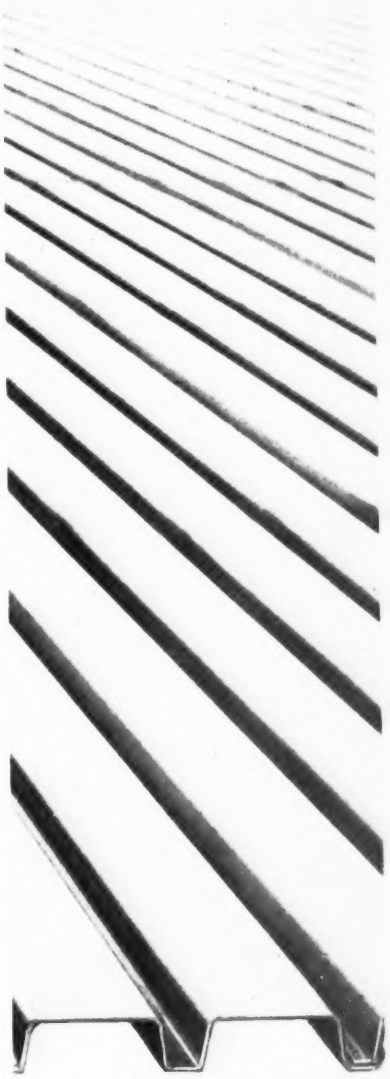

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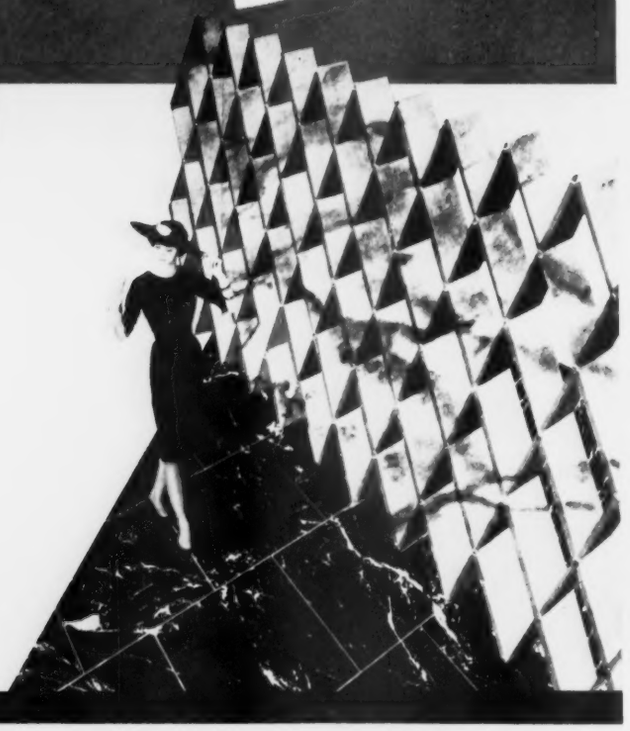

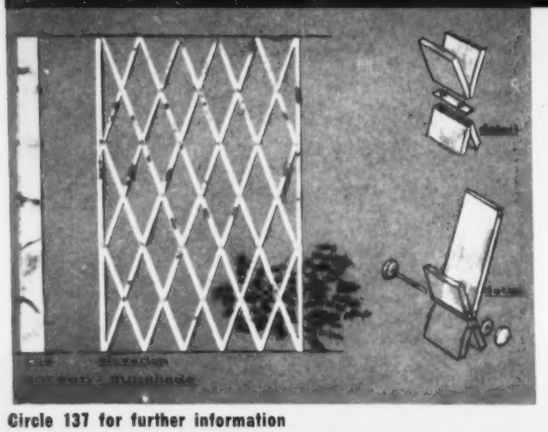

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